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SUMMARY OF RECENT ABSTRACTS *

VII. HELMINTHIASIS †

General

STEWART (p. 766) describes his method of "controlled critical anthelmintic testing" for detecting both "direct" and "indirect" activity of a drug, and quotes results obtained with various drugs in single effective doses and doses divided into smaller parts. The papers should be read in full. Piperazine citrate and piperazine adipate were tested on infections with various helminths by NAGATY *et al.* (p. 768) who stress the fact that these new drugs affect *Trichostrongylus* and *Heterophyes* which were previously difficult to treat.

TREMATODES

*Schistosomiasis**General*

In a symposium on schistosomiasis (p. 1353) KUNTZ remarked that in Africa the supposedly stable species *Schistosoma haematobium* and *S. mansoni* are found to consist of many closely related species or varieties whose relationship to human and animal hosts is not yet understood. OLIVIER discussed the survival of snails in Brazil where they do not conserve their moisture well at low humidities, from which it follows that the humidity of the micro-environment in the dry season is of the greatest importance. Eradication cannot yet be obtained. RITCHIE stated that the activity of *Oncomelania* is characterized by a

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1956, v. 53. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

† For previous articles on helminthiasis in this series see the August and September issues of the *Tropical Diseases Bulletin* each year since 1939.

delicate amphibious balance. In *O. nosophora* 95% of eggs are deposited just above the water line, in *O. quadrasi* only two-thirds. The life span is not yet known, but *O. quadrasi* can survive for at least 4 years. OLIVER-GONZÁLEZ *et al.* discussed the immunology of *S. mansoni*, which produces in man cercarial precipitins and agglutinins, and circumoval precipitins. Adult, cercarial and egg antibodies produced by artificial immunization of rabbits are stage-specific. Most commented on treatment of the human diseases, preferring tartar emetic to other drugs, in spite of its known disadvantages.

AYAD (p. 1127) reports an extensive WHO schistosomiasis survey of a number of countries from the Sudan to Yemen. The disease has not been reported in British Somaliland, but the author found *Biomphalaria* species which may be important if the proposed water reservoirs are made. This is a substantial monograph which should be read in full.

In a long paper on schistosomiasis in West and Central Africa GAUD (p. 330) shows that human factors are very important in determining distribution. In some places the disease is confined to a particular tribal area, and the degree of population concentration round water affects the density of infection (the low incidence in forest areas is related to sparsity of population). There seems to be a threshold below which the parasite has difficulty in maintaining itself. He discusses mass treatment and its drawbacks, and other measures of control on conventional lines. The paper should be read in full. Schistosomiasis exists in Madagascar, but the incidence is low; *S. haematobium* and *S. mansoni* seem to be restricted to certain tribes. GAUD (p. 332) discusses the possibilities of extension (which are not great) and the possible measures of control.

SCHWETZ did much work on schistosomes found in rodents. He (pp. 218, 1439) described *S. mansoni* var. *rodentorum* found in *Rattus rattus* in foci of human disease, and (p. 217) he showed that *Mastomys coucha* and *R. rattus* can serve experimentally as hosts for *S. mansoni* and *S. rodhaini*. He (p. 1140) discussed the hepatic lesions in wild rats naturally infected with *S. mansoni* var. *rodentorum* and *S. rodhaini*, concluding that true cirrhosis did not occur. He (p. 1129) suggested that although schistosome infection does not prevent re-infection, it confers some tolerance to light infections at well-spaced intervals, but not to heavy repeated re-infections.

LURIE and DE MEILLON (p. 1020) compare the pathogenicity of *S. bovis*, *S. mansoni* (S. African and Egyptian strains) and *S. haematobium* for mice, *Mastomys*, monkeys and guineapigs. Details should be sought in the original.

In a long monograph DE AZEVEDO and DE MEDEIROS (p. 1014) have given a general introduction to a projected full account of the fresh water molluscs of Portuguese territories overseas. Techniques for investigation are described, and classification is discussed.

NEWSOME (p. 1441) discusses immunity in schistosome infections and concludes that very little is known about it, yet it is essential that sound

policies for treatment and control should take into account the fundamental factors and mechanisms of natural and acquired resistance. He gives a tentative list of the gaps in knowledge and makes a plea for research. EVANS *et al.* (p. 614) observed the behaviour of *S. mansoni* cercariae in electrophoretically separated fractions of sera of infected and uninfected mice. The gamma globulin sample appeared to contain the factors responsible for cercaricidal activity and the formation of pericercarial envelope, and an alpha sample introduced a cercaricidal inhibitor which thus made it possible for the cercariae to form envelopes. Envelopes were found, therefore, only in those infected serum samples which contained both gamma and alpha globulins, or serum components with similar mobilities.

KAGAN (p. 215) studied the *cercarienhiillenreaktion* (CHR) with cercariae and miracidia of *S. mansoni* and *Schistosomatium douthitti* and found it valuable for detecting antibody in the sera of immunized or naturally infected animals, though there is little specificity within the family of schistosomes. The miracidial immobilization test, however, is more sensitive. KAGAN and LEVINE (p. 777) tested normal sera from many animal species, and sera from immunized animals, for reaction with living cercariae of *S. mansoni*. The normal sera were all negative for the CHR but on immunization the animals became positive. Details of the other actions of these sera should be sought in the original.

Haemagglutination titres were studied by KAGAN (p. 615) after immunization of rabbits with schistosome antigens; the results varied from negative after injection of living miracidia, to strongly positive after injection of mouse spleen containing many eggs.

VERSIANI (p. 610) has devised a method of measuring the size of the enlarged spleen in relation to schistosomiasis. The usual methods have various disadvantages.

EIWI and EL-TIRAEI (p. 209) describe the pathology of schistosomiasis of the appendix on the basis of 93 cases, noting particularly the fibrosis which leads to stenosis and obstruction. In other cases there was thickening of the wall, and in both types diffuse suppuration was sometimes found.

In Cairo 100 consecutive patients admitted to hospital for various diseases were subjected to rectal biopsy. BADRAN *et al.* (p. 771) state that 33 showed schistosome eggs in the urine, but rectal biopsy showed *S. haematobium* in 52, *S. mansoni* in 1, and both in 8. In 32 rectal biopsy was positive though 24-hour urine specimens were negative. Polypoid lesions of the sigmoid and rectum are common in Egypt. DIMMETTE and his colleagues (pp. 772, 1246) found *S. mansoni* eggs in 74.8% and *S. haematobium* in 30.2% of polyps associated with schistosomiasis. They conclude that these lesions do not tend to become malignant and that carcinoma of the large bowel is not a material hazard of this disease.

ZAKI (p. 73) observed progressive electrocardiographic changes in patients treated with Fouadin [stibophen], and suggests that persons

doing heavy manual work should not be treated with this drug. HALAWANI *et al.* (p. 609) report the death of a patient with *S. haematobium* infection on the 8th day of treatment with stibophen. A patient in whom Fouadin induced haemolytic anaemia is discussed by HARRIS (p. 1246).

It had previously been observed that complexes of antimony trichloride and antibiotics were effective when given by mouth in experimental schistosomiasis, but LUTTERMOSER *et al.* (p. 615) now show that the activity appears to be due to the antimony; the antibiotics were inactive.

The drug AB 5 [this *Bulletin*, 1955, v. 52, 378] has been tested on heavy infections with *S. haematobium* or *S. mansoni* in Dakar, and RAOULT *et al.* (p. 1359) give a favourable account of it. It is an antimonial and the contra-indications are those of other antimonials, but the course is short and the results are promising.

JACKSON (p. 1247) describes the schistosomiasis position in irrigated estates in Africa and discusses current methods of prevention. Details are given in the original abstract; they deal largely with irrigation practice.

In a study of the biology of snails in the Belgian Congo PARENT and LIETAR (p. 205) observed that in the laboratory copper sulphate and pentachlorophenate in high concentrations did not kill snail eggs though they killed the snails; re-infestation of treated waters therefore occurs if the substances are used in the egg-laying season. They should be tested when eggs are fewest.

MARKOWSKI (p. 212) has devised a palm-leaf trap for use in the Gezira irrigation system, which has proved very successful in conjunction with weeding and the use of copper sulphate. SHARAF EL DIN and EL NAGAR (p. 458) have made a notable advance in snail control in the Sudan by clearing a canal system with copper sulphate in high concentration and by weeding, and then hanging bags of copper sulphate at the intake of water to the system. These were enough to provide 0.125 p.p.m. at maximum flow, and this effectively prevented re-infestation from upstream such as occurs in unprotected canals within 3 months of heavy treatment with copper sulphate.

Laboratory and field trials of sodium pentachlorophenate were carried out in Egypt with *Bulinus truncatus* and *Biomphalaria boissyi* by KUNTZ (p. 1441). The action varied with temperature and ecological surroundings, but he concluded that the compound should be applied to the irrigation systems at 15–20 p.p.m. to ensure kill of most of the snail hosts. This concentration should be maintained for 12, or preferably 20–24, hours. Quantitative estimations of sodium pentachlorophenate in natural waters can be made by observing the mortality of fish (*Lebistes reticulatus*) in various dilutions (KLOCK, p. 1446).

Most of the new molluscicides, except sodium pentachlorophenate, are insoluble in water, and FREYTAG *et al.* (p. 775) have used surface-active agents for preparing stable emulsions of phenol derivatives. Some of these agents are toxic and may increase the action of molluscicides, and

the mixing of soluble and insoluble molluscicides may provide a valuable residual action.

Schistosoma haematobium infections

In Basrah WATSON (p. 768) found *S. haematobium* eggs in the urines of 8-36.9% of schoolchildren (lower than in 1925) and in 40.9% of the inhabitants of hut settlements in the poorer parts of the city. *Bulinus truncatus* was found in 5 of the 20 irrigation channels in and around Basrah, especially the central area where human infection is high.

BENNIE and BLAIR (p. 333) report a schistosomiasis survey of European children in schools in Southern Rhodesia; the incidence was 4.2%—higher in boys than girls and highest (up to 23.2%) in schools near rivers. There has been little change since earlier surveys. The authors note that examination of a single specimen of urine is not enough, since eggs are discharged intermittently; antigen tests should also be used. They recommend the provision of swimming baths on the most generous scale, and a programme of health education.

S. haematobium infection was found by PINTO (p. 1128) in 18-54% of people examined in 4 endemic areas of Portuguese Guinea. The intermediate host was *Physopsis africana*. In part of Angola CAMBOURNAC *et al.* (p. 1012) found urinary schistosomiasis in 32.4% of the African inhabitants.

A small focus of *S. haematobium* infection has previously been reported in Bombay State, India, and SHAH and GADGIL (pp. 606, 769, 770) report that haematuria is common in the villagers, especially in childhood, and ova have been found in the urine of a number of active cases, but not in the faeces. Intradermal tests were positive. They found that a local snail, *Ferrissia tenuis*, is probably the intermediate host. In comment Standen remarks that this is the first time a member of the Ancyliidae has been incriminated as a host of a human schistosome, and suggests that the mammalian phase should be established in experimental animals. DHANDA (p. 1358) reports from a different area, New Delhi, the finding of eggs resembling those of *S. haematobium* in 4 of 500 specimens of faeces examined. There were no ova in the urine and the subjects had no symptoms of schistosomiasis.

KUNTZ and MALAKATIS (p. 459) attempted to infect 278 mammals of 13 species with *S. haematobium*. Rodents were the most susceptible and the Nile rat (*Arvicanthis niloticus*) continued to excrete eggs, largely in the faeces but also in the urine, for up to 3 years. It would be a suitable laboratory host.

ZAKARIA (p. 71) studied *Bulinus contortus* in a canal system in Iraq; it collects near willow trees, in a lightly shaded environment and is attracted to a green alga, not to decaying organic matter. The snail population decreased in the cold weather (down to 8°C.) but a small number of snails were always active where food was plentiful. Rapid desiccation caused high mortality, but snails burrow into mud and die

there only when the mud dries. Copper sulphate applied at 20 p.p.m. dropped to 1 p.p.m. in 2 hours, but reduced the snails by about 95%. *Bulinus forskali* has been incriminated as an intermediate host of *S. haematobium* in Gambia and Mauritius, but McCULLOUGH (p. 455) has not found it infected in Ghana, nor could he infect the local strains experimentally. In commenting on this work WRIGHT (p. 456) questions the original identifications of the snails assumed to be *B. forskali* in Gambia and Mauritius, which led to the view that it was a host. He thinks that it is not an important vector in Gambia. In that country SMITHERS (p. 1438) found *Bulinus jousseaumei*, *B. guernei* and *B. senegalensis* to be hosts of *S. haematobium*. *B. forskali* occurs widely, but although a potential host it was not infected in nature; *B. globosus* occurs in small numbers but was not infected.

In an investigation of the distribution of eggs of *S. haematobium* in male patients ALVES *et al.* (p. 72) found them in the organs closely adjacent to the bladder (seminal vesicles, prostate and intra-abdominal vas deferens) rather than in those more remote (testis, epididymis and tunica). They were also frequently found in the rectum. In bowel infections with *S. mansoni*, eggs were found (infrequently) in seminal vesicles, testis and bladder.

In S. Africa, HIGGINSON and DE MEILLON (p. 608) examined portions of liver taken at autopsy from Africans infected with *S. haematobium*. After digestion of the liver specimens eggs were found in a proportion of cases, but the intensity was low, and no significant correlation could be found between disorders of the liver and the schistosome infection.

An association between urinary schistosomiasis and cancer of the bladder has been observed in Iraq by SHAMMA (p. 337), but it is not known how the ova exert their carcinogenic action. Carcinoma and papilloma of the bladder are said to be common complications of schistosomiasis in Egypt, and DIMMETTE *et al.* (p. 338) made cytological studies of urine from inhabitants of a village where schistosomiasis is endemic, to see if the cells suggested malignant change. There were many difficulties in interpretation and they conclude that the procedure is of little value in mass surveys for detecting malignancy. DAWOOD (p. 1246) agrees with this. Similarly, HALAWANI and TAMAMI (p. 770) found malignant cells in 5 of 526 urines from patients with schistosomiasis (none in 475 free from schistosomiasis). The diagnosis was confirmed in all, and they describe the cells.

Haematemesis, probably the result of portal congestion, occurred in a European child with heavy *S. haematobium* infection in S. Rhodesia; MILNE and DARLING (p. 457) found a much enlarged, tense and tender liver. Treatment with anthiomaline was successful.

A fatal case of myocarditis due to *S. haematobium*, with necrotic foci and eggs in the myocardium, and perivascular changes, congestion and eosinophil infiltration, is reported by AL ZAHAWI and SHUKRI (p. 1012).

DI EGIDIO (p. 1129) states that the radiological picture of urinary

schistosomiasis is characteristic, and illustrates his paper with reproductions of radiographs to show the appearances described.

SHERIF (p. 1359) describes a new antigen prepared from miracidia of *S. haematobium* and used in an intradermal test. The results of a large series show that the test is remarkably good in detecting active disease; it was negative in controls and in patients cured 6 months previously, but positive in those cured only 1-3 months previously.

Various schedules of stibophen were tried in *S. haematobium* infections in Liberia by MILLER and LYON (p. 772) who report favourably on daily intramuscular injections for 2 days, repeated after an interval of 2-4 days, as a means of mass treatment. The cure rate was 79%. KOLLERT (p. 1439) tried several schedules of treatment with lucanthone in Angola; the best was a total of 100 mgm. per kgm. spread over 6-10 days, beginning and ending with small doses.

In an island in Lake Nyasa MACLEAN (p. 1013) observed that health education has had little effect in controlling *S. haematobium* infection. It is not possible to eradicate the snails from the shore by poisoning but treatment with lucanthone or trivalent sodium antimony gluconate has reduced the infection rate. Selected watering and bathing places can be freed from infection and persons at special risk can be given protective clothing.

Schistosoma mansoni infections

In part of Brazil PESSOA *et al.* (p. 1130) found *S. mansoni* infection in 40% of people in a rural area and 26% in a town, but the severity of the disease in general was much less than in a neighbouring area where re-infection was heavier and more frequent.

An investigation in Puerto Rico indicated that although *S. mansoni* can mature and produce viable eggs in the pig, this animal is a poor host and is unlikely to be important in transmission (RIGGIN and BERRIOS, p. 896). In a survey of mammals of 3 orders and 17 species in Brazil, MARTINS *et al.* (p. 898) found 7 species naturally infected with *S. mansoni*. Of these 3 were already known hosts, but 4 (all rodents) were reported for the first time. The opossum *Didelphis p. paraguayensis* has been found naturally infected in Brazil (BARBOSA and COELHO, p. 1251).

LAGRANGE (p. 1017) sums up the work of 8 years of the study of the pathology of *S. mansoni* infection in experimental animals. The different species react differently and the reactions are not necessarily like those in man. The human disease may be affected by intensity of infection, and by diet, as in one community in the Belgian Congo where shortage of food induced a grave epidemic which ended when the diet was rectified.

MOORE and MELENEY (p. 214) found that in mice infected intraperitoneally with cercariae of *S. mansoni* most of the surviving young flukes remained in the peritoneal cavity, and developed there. This did not happen in hamsters.

COELHO (p. 1250) describes the histopathology of *S. mansoni* lesions

in naturally infected *Rattus r. frugivorus* in Brazil. DAUGHERTY (p. 613) studied the effect of *S. mansoni* infection on liver function in mice. Respiration of liver tissue did not differ much from the normal. Slight changes were found in some other functions.

A satisfactory technique for the maintenance of *S. mansoni in vitro* in a medium of horse (or human) serum with 0.1% glucose is described by ROBINSON (p. 1013).

GÖNNERT (p. 461) has published a series of papers on the anatomy and histology of *S. mansoni*, ovulation and the fate of the egg, the action of Miracil D, and the pathology of the infection in mice. Eggs which are not excreted die in 3-4 weeks, and may be absorbed. The parasites die 1-2 weeks after Miracil D has been given, but damaged worms may recover. The liver damage is described, with a note that extensive regeneration occurs after cure of the infection. These papers contain much detail, which should be sought in the original.

DEWITT (p. 206) shows that the ability of *S. mansoni* miracidia to penetrate the snail host is directly related to environmental temperature and that the optimum temperature may be limited by the maximum temperature tolerated by the snail. The miracidia could not penetrate *A. glabratus* at a temperature as low as 10°C.

DE LUCENA (p. 74) discusses the general morphology of planorbid. GISMANN (p. 334) reviews the Planorbidae of Egypt and the Near East. The paper is largely devoted to systematics, but the author discusses the snails in relation to transmission of schistosomes. The paper should be read in full.

Technical studies of the morphology of *A. glabratus*, *A. nigricans* and *A. centimetralis*, which should be studied in the original, have been published by PARAENSE and DESLANDES (pp. 208, 610). PEREIRA and DESLANDES (p. 74) were unable to determine the age of *A. glabratus* from shell characteristics and internal anatomy.

An albino strain of *A. glabratus* has been established which is highly susceptible to *S. mansoni*; NEWTON (p. 460) thinks that its transparency may be useful in the study of the development of the parasite or the action of molluscicides. Attempts to induce crossing between *A. centimetralis* and an albino strain of *A. glabratus* failed, and this suggests that the species are distinct; PARAENSE and DESLANDES (p. 1132) give reasons for retaining *centimetralis* in the genus *Australorbis*.

DE ANDRADE and his colleagues (pp. 341, 1131) give an account of the chemical composition of water in which Planorbid snails are found in part of Brazil.

A method for estimating the density of *A. centimetralis* in pools is described by OLIVIER and SCHNEIDERMAN (p. 1131).

In Brazil PARAENSE *et al.* (p. 897) have found live *A. glabratus* buried in mud near water, at depths up to 40 cm., presumably to escape the effects of desiccation. They could therefore escape the action of molluscicides. PERLOWAGORA-SZUMLEWICZ and DIAS (p. 1136), however, found

that *Australorbis immunitis* placed below the surface of mud in various degrees of saturation soon died, regardless of depth and degree of saturation. Survival was restricted to those which were able to crawl out of the mud, and the authors do not think it likely that snails penetrate soil to protect themselves from molluscicides.

OLIVIER (p. 1016) investigated the effects of desiccation on *A. glabratus* and *A. centimetralis*. Most snails remain stranded when flood waters recede, and active burrowing is unlikely and may be detrimental. Snails found deep in the soil probably get there by agencies other than their feeble powers of burrowing. They can remain alive for long periods in soil which is not over-saturated, but water-saturated mud is very detrimental. Mortality is markedly increased by desiccation, however. Important differences in ability to resist drying in clay pots were observed by OLIVIER (p. 1443), working with *A. centimetralis* and *A. glabratus*. Snails collected from dry vegetation lived for 5–21 months out of water but in a moist atmosphere, whereas those from permanent waters lived only a few days. It is not claimed that the snails can resist severe desiccation in a dry atmosphere. In conditions of gradual drying in soil *A. centimetralis* tended to live longer than *A. glabratus*, but both could live for long periods out of water; most remained on the surface of the soil, but snails buried in dry soil lived as long as those on the surface. Wet mud was rapidly fatal (OLIVIER and BARBOSA, p. 1444).

In a survey of the Planorbidae of part of Brazil BEZERRA (p. 898) found infection with *S. mansoni* in only 1 species, *Tropicorbis stramineus*.

DE AZEVEDO and DA COSTA FARO (p. 1133) found that when attempts were made to infect with *S. mansoni* from Mozambique the snails *A. glabratus*, *P. dufourii* and *Biomphalaria pfeifferi*, only the last was susceptible. SCHWETZ *et al.* (pp. 72, 774), however, succeeded in infecting *P. dufouri* with *S. mansoni*, though in nature it is the host of *S. haematobium*.

BARBOSA and COELHO (p. 1249) found *A. centimetralis* much less susceptible than *A. glabratus* to *S. mansoni*.

BARBOSA *et al.* (p. 1249) observed that infected *A. glabratus* shed cercariae of *S. mansoni* in a marked cycle, mainly between 11 a.m. and 5 p.m. daily. They lived on the average about 40 days and liberated over 4,500 cercariae every day, some many more. Mostly the infection killed the snails, but in a few instances the infection died out. When infected *A. glabratus* are removed from water they die in much greater numbers than uninfected snails. OLIVIER *et al.* (p. 1250) show that infected snails which survive in this way more than 20 days tend to lose their infections.

Lesions of the intrahepatic portal radicles in *S. mansoni* infection are of 3 types:— substitution of a portal radicle by granuloma; fibrosis and narrowing; intrahepatic thrombophlebitis (only in advanced cases). LICHTENBERG (p. 210) states that intrahepatic vascular lesions may arise early, and are common in severe cases. BIBAWI *et al.* (p. 339) report

studies on the portal circulation in *S. mansoni* infection, in which a series of tests (including various estimates of circulation time) were used. Details should be sought in the original.

In Brazil DA SILVA *et al.* (p. 1133) showed that when 5 stool examinations were made within a few days the positive results for *S. mansoni* and other worms were doubled in comparison with a single examination.

The pulmonary X-ray appearances in *S. mansoni* infection are described by BALDÓ (p. 1134), who found some abnormal shadows in the lung fields in 26.8%, some cardiac enlargement in 15.6%, and other conditions.

SCHNEIDER *et al.* (p. 1440) isolated an antigen from adult *S. mansoni* which reacts in the complement-fixation test with serum from human beings infected with *S. mansoni* and with heterophile substance in normal rabbit serum. Its value is yet to be determined.

SPINGARN and EDELMAN (p. 211) treated *S. mansoni* infections with stibophen—giving 40–50 cc. in 15–19 days, or 19–57 cc. within 5 days. Relapse occurred eventually in 60% of the former group and 27% of the latter, but with the short course severe reactions were common. In patients with *S. mansoni* infection OLIVER-GONZÁLEZ *et al.* (p. 612) found that circumoval precipitins tended to disappear from the serum after treatment with stibophen, but that the intradermal test with schistosome egg antigen, negative before treatment, tended to become positive, probably as a result of some action which sets up skin sensitization, but not indicating that treatment is successful.

Lucanthone has proved useful in the treatment of schistosomiasis in the Belgian Congo, but has been unsatisfactory in Egypt. Investigating this GÖNNERT and VOGEL (p. 73) found in mice that an Egyptian strain of *S. mansoni* was relatively resistant, compared with a Liberian strain.

In tests of certain *p*-aminodiphenoxyalkanes for the treatment of infected mice STANDEN (p. 217) observed that only sexually mature *S. mansoni* were affected by the drugs. He argues that 2 courses of treatment, 4 weeks apart, should prove beneficial in human infections by making sure that worms which are immature at the start come into contact with the drug at maturity. Laboratory tests for cure of experimental *S. mansoni* infections with compounds of the di-(*p*-aminophenoxy) alkane series are reported by HILL (p. 1141). STANDEN (p. 616) treated mice infected with *S. mansoni* by means of 1:7-*bis* (*p*-dimethylamino-phenoxy) heptane by mouth, and reports the degenerative changes observed in the worms. They are rendered immobile, and they stimulate foreign-body reactions and are destroyed by phagocytosis. The relative activity of schistosomicides is probably related to the degree of immobility conferred and the time required for foreign-body reactions to develop. The drug had no apparent effect on the eggs but had a marked effect on the egg-laying of the worms.

DE MEILLON *et al.* (p. 1443) tried a new German drug (S 616), of which the composition is not revealed, against *S. mansoni* in mice. Its action

was powerful but until more is known about its toxicity judgment of its clinical prospects must be suspended.

CORRÊA and AMATO NETO (p. 775) failed to find benefit from stannous oxide in *S. mansoni* infections, in spite of previous good reports.

DESCHIENS and his colleagues (pp. 207, 336, 337) immersed in the river Seine planorbid snails of importance in schistosomiasis. They surmise that some of the snails may have been killed by crayfish and that the latter may therefore be useful in control, but more work remains to be done. They found that crabs of the genus *Potamon* from Tunisia also killed snails, and suggest that they too could be used in control.

A colorimetric method for estimating copper in breeding places of planorbid is described by PAULINI (p. 1136), who also describes a simple apparatus for applying molluscicides in solution. DE JESUS (p. 899) reports failure to control snails with lime in Brazil, but success with copper sulphate in concentrations of 1 in 100,000 or 1 in 300,000. AGUIRRE *et al.* (p. 899) found copper sulphate effective at 1 in 50,000 or 1 in 100,000, the treatment of collections of water being continued for 48-72 hours by spraying with a 10% solution.

In tap water copper sulphate poisons *Australorbis* snails more quickly than sodium pentachlorophenate, and PERLOWAGORA-SZUMLEWICZ and DIAZ (p. 1137) suggest that in conditions in which it is not possible to maintain low concentrations for a long time the application of high concentrations of copper sulphate for short periods may be better. The first author (p. 1138) shows that the residual action of pentachlorophenate in water and mud is prolonged, but that of copper sulphate is relatively short. The same authors (p. 1138) point out that even if water is treated in the dry season when it is accessible, it can be re-contaminated when aestivating snails are washed into it at the onset of the rains. They tested a number of compounds for residual action to overcome this difficulty, taking into account mud, sunlight, temperature, pH, vegetation, etc. The only one not affected by mud was an emulsifiable oil of pentachlorophenol, and this had residual action for 2-3 months. A new BHC paste seems also to be an outstanding molluscicide, with a residual action equal to that of the pentachlorophenol oil.

HALAWANI and LATIF (p. 1140) show that β -nitrostyrene has a powerful action on planorbid snails at a concentration of 10 p.p.m.

OLIVER-GONZÁLEZ *et al.* (p. 1444) observed that *A. glabratus*, though common elsewhere in a certain creek, was not found where the snail *Marisa cornuarietis* was prevalent, probably because of competition for food or because the eggs of *A. glabratus* were eaten by the other snail. In experimental work with this snail CHERNIN *et al.* (p. 1445) conclude that it is not a purposeful predator of the eggs of *A. glabratus*, but eats them as it were by accident in its voracious feeding. The same authors (p. 1446) show that the leech *Helobdella fusca* devours young *A. glabratus*, and is an effective means of control in the laboratory, but does not apparently inhabit the same waters as the snail in nature.

DIAS (p. 776) sums up the work done on *Bacillus pinottii*, which has been used in South America to kill *A. glabratus*. DIAS and DAWOOD (pp. 213, 609) have now tested it in Egypt, in the laboratory and in the field, with successful results against *Biomphalaria boissyi* and other snails. Its use is recommended for *B. boissyi* which occurs in limited and isolated foci.

BAUMAN *et al.* (p. 216) found Abbott's Insect Repellent Cream (containing Rutgers 612, Indalone and dibutyl phthalate) effective against infection of mice with *S. mansoni*.

Schistosoma japonicum infections

In Formosa *S. japonicum* infection was found by Hsü *et al.* (p. 778) in 8.6–21.5% of small wild rodents. Stool examinations were almost entirely negative in over 4,000 villagers, though intradermal tests were positive in 8.4% of a smaller number. It may be that in Formosa *S. japonicum* is a zoophilic strain, not easily producing eggs in man.

Ito (p. 618) has found the rabbit to be the most suitable host for the study of *S. japonicum*.

The hatchability of *S. japonicum* eggs in various conditions was investigated by Ito (p. 1141) who found that the optimum temperature was 13°–38°C. Emergence was prolonged in saline solutions, and 4% saline was fatal to the eggs. Desiccation of faeces was rapidly harmful, and immersion in wet faeces or urine was fatal in up to 20 days at 28°C., though viability was much prolonged at lower temperatures.

Formosan macaques are highly susceptible to Japanese and Philippine strains of *S. japonicum* but not to a Formosan strain, though Japanese and Philippine monkeys are susceptible to the Formosan strain. Hsü and Hsü (p. 1360) conclude that the Formosan strain of *S. japonicum* differs from the others.

Hsu (p. 1020) discusses the morphology of *Oncomelania* snails in part of China, and their bionomics. They are amphibious, prefer shaded and moist ground with rich food and regular flooding to enable egg-laying and hatching to occur. Cercariae begin to emerge in February and continue until August, though some may be produced even until January. Control may best be brought about by building dykes to prevent flooding.

WAGNER and colleagues (pp. 1447, 1448) investigated the factors influencing egg-laying in *O. nosophora* and *O. quadrasi*; the latter was much less specific in its choice of egg-laying sites than the former. Both produced more young at 26°C. than at 20°C. or 32°C., and both laid the majority of eggs above the water line. Flooding caused some reduction in egg-laying of *O. nosophora* but not of *O. quadrasi*.

OTORI *et al.* (p. 1447) investigated the incubation period of the eggs of *O. nosophora* in mud. The period varied from 11 to 35 days according to temperature and possibly conditions of moisture.

YOSHIZUMI *et al.* (p. 617) used needle biopsy of the liver for diagnosis of *S. japonicum* infection and found eggs in 68 cases in which none could

be found in faeces. They recommend the method for patients from an endemic area who have fever and indefinite symptoms.

CHUNG *et al.* (p. 1449) prepared antigens for an intradermal test from *P. westermani*, *C. sinensis*, *S. japonicum* and *F. hepatica*. They found that patients infected with one of the first 3 mostly gave reactions to all antigens, and most (but not the clonorchiasis subjects) reacted best to the homologous antigen.

Schistosoma dermatitis

OLIVER and SHORT (p. 1252) found that miracidia of *Schistosomatium douthitti* died within 25 hours after hatching.

KAGAN and MERANZE (p. 341) studied the inflammatory response of the skin of normal and immune mice to exposure to cercariae of *Schistosomatium douthitti*, and BATTEN (p. 900) describes the histopathology of swimmers' itch in experimental animals.

A cercaria probably of *Trichobilharzia* sp. was found by FAIN (p. 1142) to cause swimmers' itch in the Belgian Congo. BEARUP (p. 219) describes a schistosome cercaria from a marine snail in Australia, which causes dermatitis in man. The adult worms have been recovered from experimentally infected birds. 2 new species of schistosome cercariae producing dermatitis are reported by EDWARDS and JANSCH (p. 219) from British Columbia.

Other trematode infections

SANDOSHAM (p. 1126) published a check list of the helminth parasites of man in Malaya. He notes that although *Clonorchis sinensis* is found in fish-eating animals it is rare in man because the Chinese have largely given up the habit of eating raw fish. *S. japonicum* cannot become established because there are no species of *Oncomelania*. CHUNG *et al.* (p. 76) examined patients with clonorchiasis; liver function tests were mostly normal, the complement-fixation test was unhelpful, but the intradermal test with a saline extract of the adult worm was positive—though similar antigens from *Fasciola* and *Paragonimus* were also positive. Chloroquine appeared to be successful in treatment, when given daily for 20–53 days to a total of 19·5–39 grammes.

The liver fluke *Opisthorchis viverrini* is a parasite of man, dog and cat, and the incidence of human infection is high in north-eastern Thailand where rates up to 66% have been found in Siamese children. SADUN (p. 620) states that the Chinese inhabitants were almost free, owing to the fact that they cook fish thoroughly before eating it. Control is probably only possible by prevention of the eating of raw fish. SADUN *et al.* (p. 778) in Thailand found some value in chloroquine (up to 7·8 gm. of base in 23 days) in the treatment of this infection.

CHUNG and his colleagues (p. 1361) suggest 3 procedures for the diagnosis of obscure cases of paragonimiasis:— history of eating the fish hosts in an endemic region, the intradermal test, and the complement-fixation

test of serum and spinal fluid. With an antigen prepared from adult *Paragonimus westermani* they (p. 77) tested infected persons and controls by complement-fixation and intradermal tests. All infected persons were positive with both tests, but 1 of 21 controls was positive to the intradermal test and 5 gave modified reactions.

The Middlebrook haemolytic reaction with an antigen prepared from *P. westermani* seems to be specific (KOIZUMI, p. 1252).

In discussing the radiological diagnosis of paragonimiasis CH'IEH (p. 78) relates the findings to the 4 stages of the disease—first the stage of pneumonitis, second the stage when the inflammation has gone and a cyst is left, third the formation of a dense fibrotic nodule after death of the worm, and fourth the calcification of the mass. He describes the X-ray appearances at these stages. KULKA and BARABÁS (p. 618) describe the clinical and radiological features of paragonimiasis. The typical lesion is a ring shadow surrounded by relatively unchanged tissue 5–10 mm. in diameter (or sometimes more), usually basal but occasionally infraclavicular. Pleurisy is common. They used emetine, sulphamethythiazole and a camphor-quinine preparation in treatment. LEE (p. 901) describes the X-ray appearances found in paragonimiasis, noting especially the “radiolucencies” within densities as a most important sign.

In Egypt WELLS and RANDALL (p. 1451) found 3 species of *Heterophyes* (*H. heterophyes*, *H. dispar* and *H. aequalis*) in kites, dogs, cats, jackals, foxes and rats. Metacercariae were found in 7 species of freshwater fish, and 2 (*Sciaena aquilla* and *Solea vulgaris*) are new hosts of *H. heterophyes*. The preferred second intermediate hosts, however, are fish of the genus *Mugil* (mullet). *H. heterophyes* is common in Egypt, and they (p. 621) have found it in salted mullet sold as food, though the number of viable metacercariae diminished with the length of time the fish was kept in brine. Tests with puppies indicate that after 2 weeks in brine the fish may be safe for human consumption, but more work is needed on this subject.

A cyst containing an adult *Heterophyes* was taken from the brain of a man who had served in the Far East; GALLAIS *et al.* (p. 1143) note it as probably the first record of an adult trematode in a cerebral cyst in man.

BUCK and UHRMANN (p. 1143) report infection with *Echinostoma lindoense* in 42–85%, and with *S. japonicum* in 22–32%, of inhabitants of the remote Lake Lindus area of central Celebes.

ROWAN (p. 1361) has studied the mode of hatching of the egg of *F. hepatica*.

The parasitic pharyngitis known in the Middle East as *halzoun* has been said to result from eating raw liver containing young *F. hepatica*. WATSON and KERIM (p. 1450) found 2 cases in which leeches were responsible, but although they could not find evidence that adult *F. hepatica* can attach itself to the pharynx, they think that the young worms may be able to do so.

CESTODES

SILVERMAN and MANEELY (p. 624) show that the secreting gland of the hexacanth embryo of *Taenia* plays an active part in penetrating the intestinal mucosa. SILVERMAN (p. 79) describes a technique for studying the effect of normal and immune serum on the hexacanth embryos of *Taenia saginata* and *T. pisiformis*.

Taeniasis has become a serious problem in the stock-raising territories of the Belgian Congo, in one of which 7% of the population were found to be infected. Other helminthic infections are also common. VAN GRUNDERBEECK and PENSON (p. 81) tried 8 drugs in treatment and found amodiaquine the most successful. Mepacrine and Stannoxyl were also useful. *Taenia saginata* is widespread in Portuguese Guinea, where LECUONA (p. 1452) used amodiaquine successfully.

SEATON (p. 80) treated patients with *T. saginata* infection by passing a duodenal tube and administering 1 gm. of mepacrine in 100 ml. warm water through it, followed by magnesium sulphate solution 15–20 minutes later. He found this treatment more successful than any other.

FENG (p. 1025) advocates, for the treatment of *T. saginata* or *T. solium* infections in China, 80–125 gm. of a powder of pumpkin seed kernels, either fresh or after being boiled in water, followed 2 hours later by 60–100 gm. of areca-nut decoction and, $\frac{1}{2}$ hour later, by 30 gm. magnesium sulphate. The materials are readily available in China. Both KUŹMICKI (p. 901) and PAWLOWSKI (p. 902) write fairly favourably of the use of pumpkin seed (*Semina Cucurbitae*) in *Taenia saginata* infection. The treatment needs more exact definition, but does not give rise to secondary symptoms.

Bovine cysticercosis was not found in Great Britain until 1947, but has been regularly noted since. SILVERMAN and GRIFFITHS (p. 622) found that *Taenia* ova tend to escape from sewage disposal plants, and reach cattle. Under modern conditions most sewage treatment methods fail to retain the ova, which may survive in air-dried sludge. When gravid segments were fed to pigeons no viable eggs were excreted, but with seagulls gravid eggs could be found in faeces within an hour of ingestion. Absence of a crop in the seagull may be the explanation. The role of birds in transmission cannot yet be assessed.

Hydatid infection is common in Algeria, where LACROIX *et al.* (p. 1453) found it in 29–46% of cattle, 50–81% of sheep from urban areas, and in a number of children. Control of abattoirs is useful, but will not affect sheep dying while being moved about the country, and these are a source of infection of dogs. The most hopeful preventive measure, therefore, is to kill stray dogs and treat domestic dogs regularly with anthelmintics. Examination of *Sarcophaga tibialis* given access to faeces from a dog infected with *Echinococcus granulosus* suggests that these flies may be important in transmission of infection to man in S. Africa, since they frequent human habitations (HEINZ and BRAUNS, p. 1253).

2 cases of cerebral coenuriasis in man are reported by WATSON and LAURIE (p. 624) from S. Africa; the infection may be commoner than is realized, especially in sheep-rearing localities where dogs are numerous. The clinical picture is one of increased intracranial tension only, and diagnosis is therefore very difficult. Operation is often successful.

Hymenolepis nana is the commonest tapeworm in Chile. NEGhme and SILVA (p. 221) state that infection rates are highest in children up to 14 years old. The mechanism of transmission is similar to that of *Ascaris*.

BAER and SANDERS (p. 1453) report *Railletina celebensis* from a child in Australia, for the first time, and also from *Rattus assimilis*.

KUHLow (p. 220) tested the susceptibility of various fish (in Germany) to infection with *Diphyllbothrium latum*; he also found that frogs could act as hosts. Various mammals are the final hosts—the dog may be important in the spread of the infection.

After considering the age distribution of pernicious tapeworm anaemia and Addisonian pernicious anaemia TÖTTERMAN and ÅHRENBORG (p. 779) conclude that the pathogenesis of both is similar. They regard the stomach as the big determining factor in both types. In describing the anaemia due to *D. latum* VON BONSDORFF (p. 1023) states that the host and the tapeworm in the intestinal canal compete for vitamin B12, and a deficiency in this substance may result, causing pernicious anaemia if the worm is in the proximal part.

Sparganosis may be commoner than the literature suggests, and 2 cases are described from Uganda by KIREMERWA *et al.* (p. 1024), one having a tumour on the colon containing the worms, the other a small swelling on the eyeball.

A sparganum, probably *Diphyllbothrium decipiens*, is reported for the first time from Uruguay. OSIMANI and PEYRALLO (p. 1144) removed it from an abscess in the leg.

The first record of the cestode *Dibothriorhynchus* sp. type *grossum* infection in a human being is reported by HEINZ (p. 1146) from S. Africa.

Charles Wilcocks

(To be continued)

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control; Animal malaria—monkeys, other animals, birds.

COLLIGNON, E. & JUILLAN, M. Les indices endémiques palustres dans le voisinage de la station expérimentale du Marais des Ouled Mendil en 1956. [**Malaria Endemic Indices in the Neighbourhood of the Experimental Station of the Ouled Mendil Marsh, Algeria, in 1956**] *Arch. Inst. Pasteur d'Algérie*. 1957, Mar., v. 35, No. 1, 31–4, 1 plan.

As has been usual for 20 years, no enlarged spleens or evidence of malaria have been found among the staff of the Experimental Station or their families in 1956.

The usual results of spring and autumn surveys of the indigenous people in 3 areas in the neighbourhood of the Station are tabulated. The spleen rates were 2% of 243 persons and 1% of 314 respectively. No anophelines were found. It would seem that old cases of malaria have ceased to be infective and that the few slightly enlarged spleens found might be accounted for by infections other than malaria.

It is clear that the careful surveillance which is regularly carried out since the marsh was drained continues to justify itself [see also this *Bulletin*, 1955, v. 52, 868]. H. J. O'D. Burke-Gaffney

DRAPER, C. C. & SMITH, A. **Malaria in the Pare Area of N.E. Tanganyika.**

Part I: Epidemiology. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Mar., v. 51, No. 2, 137–51, 1 map. [18 refs.]

The Pare area has been chosen for an experiment in the methods and effects of malaria control, the account here given being the preliminary epidemiological survey. The methods of survey and of description follow those previously described by DAVIDSON and DRAPER [this *Bulletin*, 1954, v. 51, 456] in a survey some 70 miles away. The Pare area is relatively isolated at the foot of steep hills. Streams from these hills are used for irrigating rice and also create extensive swamps. The mean rainfall is 34 inches and the actual for the 2 years considered 17 inches and 52 inches. The climate is perennially warm but humidity is on the whole low and there is a considerable daily swing of temperature. The general epidemiology is in principle much the same as in the previous survey though it differs in particulars.

Anopheles gambiae and *A. funestus* are the chief carriers; their gonotrophic cycle varies from 2 to 3 days. *A. funestus* consistently feeds on man and rests in houses but *A. gambiae* is partially deviated to cattle where they are numerous, and in these places often rests outdoors, it being estimated that the indoor and outdoor populations are about equal.

Sporozoite rates are low, values of 0.5 and 0.31% being recorded for *A. gambiae* and 0.28 and 0.54% for *A. funestus*. [In the previous survey the respective values were 4.7 and 3.4%.] From examination of the data it is deduced that the mortality of these mosquitoes lies between 15 and 20% per day, about double that recorded elsewhere. Consistently with this the malaria is less intense. In the swamp areas typical holo-endemic conditions are attained, the main carrier here being *A. funestus* and the importance of *A. gambiae* reduced by deviation to the numerous cattle present in such places. Elsewhere the intensity of malaria is relatively low, the maximum child spleen and parasite rates recorded for any age-group being 67% and 49%. Malarimetric findings are given in full, including data on the density of gametocytes in the various age-groups and in an age-standardized population. The apparent inoculation rate from entomological observation is about 27 to 53 times per year in the swamp areas, and 13 to 27 times elsewhere, though the infant parasite rate indicates a successful inoculation rate of only once a year, a discrepancy previously recorded.

The significance of these findings is discussed and it is concluded that in comparison with areas nearer the coast endemicity is considerably lower and does not lead to the acquisition of such a strong immunity, and that the application of an insecticide producing a daily mortality of at least 50% among the anophelines might well interrupt transmission. [This survey, of interest by itself, should be of particular value in relation to expected accounts of the subsequent control experiment.]

G. Macdonald

BULL. WORLD HEALTH ORGANIZATION. Geneva. 1956, v. 15, Nos. 3, 4 & 5, 369-511, 549-611. **Malaria.**

Most of the papers considered below were prepared for various conferences on malaria. Mainly entomological, they supplement other papers in the same issue, abstracted elsewhere [this *Bulletin*, 1957, v. 54, 778], dealing with malaria and its control in different countries.

The policy of the World Health Organization of striving for complete eradication of malaria emphasizes the need to understand the genesis of epidemics from residual or fresh foci. G. MACDONALD (pp. 369-387) considers this problem. Graphs for growth rates of *P. vivax* and *P. falciparum* epidemics summarize the probable course of epidemic development under different conditions from foci of one infected person per thousand population. These conditions are summed in the basic reproduction rate, a numerical value much influenced by numerous variables, several of which are parasitological or entomological. The values on which the graphs are based range from 5 to 500, this being the estimated number of secondary cases which may arise from a primary case. It is important, particularly with conditions favouring high rates, to have a surveillance system sufficiently efficient to detect early the

genesis of the epidemic threat. With high reproduction rates, detection of foci should be as rapid as within two weeks of secondary cases, and insecticide control should not be relaxed prematurely. Mathematics are largely confined to an annex.

Evidence of resistance to insecticides in some malaria vectors and other insects is summarized by J. R. BUSVINE (pp. 389-401) who discussed the phenomenon on broad biological principles. It is concluded that even if, as may be so, malaria vectors do not become so comprehensively and completely resistant as the house-fly, the margin of safety to ensure control of normal susceptible mosquitoes is, for some species, so narrow that development of even a low level of resistance could be serious. Standardized tests for detecting resistance are discussed and advocated.

DDT-resistance in adult *Anopheles sacharovi* in Greece is reported by G. A. LIVADAS and K. THYMAKIS (pp. 403-413) with some suggestion also of tolerance to other chlorinated hydrocarbons. In the Peloponnesus, G. D. BELIOS and G. FAMELIARIS (pp. 415-423) find the larvae of *A. sacharovi* still susceptible to DDT but resistant to chlordane and dieldrin, although the last two insecticides have been much less used. There are several papers on the nature of variation in the behaviour of malaria vectors: M. T. GILLIES (pp. 437-449) on *A. gambiae* in Africa, A. GRJEBINE (pp. 593-611) on this (and other) species in Madagascar, and G. GIGLIOLI (pp. 461-471) on *A. darlingi* in South America. Special regard is given to the threat to successful vector eradication, which may exist after control by house-spraying, in persisting populations of the mosquito having zoophilic and exophilic habits. Everything pivots on the stability of such behaviour. Giglioli develops an interesting analysis for behaviour in *A. darlingi* which may be, although less clearly so, applicable to *A. gambiae*. The possibility of a genetic basis to behavioural differences in *A. gambiae* is suggested by G. FRIZZI and M. HOLSTEIN (pp. 425-435) who report in some detail with diagrams and photographs of chromosomes on a cytogenetic study of *A. gambiae*. M. T. GILLIES (pp. 451-459) contributes a further paper, relevant to age determination in mosquitoes, describing a new character—the mating plug—which is an additional marker of very young females.

B. WEITZ (pp. 473-490) describes and discusses the precipitin ring test for the identification of blood-meals in blood-sucking arthropods. Generally, this suffices for work in malariology, but some account is included of his new technique—the inhibition of agglutination test—which is capable of differentiating a wide range of animals including closely related wild animals.

L. J. BRUCE-CHWATT (pp. 491-511) summarizes the physical principles of radio-activity and reviews the literature and his own investigations in terms of the advantages and disadvantages of radio-active isotopes for marking, and other studies on insects, particularly mosquitoes.

Distribution maps illustrate a contribution on the anophelines of West Africa, the Cameroons, and French West Africa by J. HAMON, J. P. ADAM

and A. GRJEBINE (pp. 549-591). Each species is dealt with separately in the text with some emphasis on fluctuations in population numbers besides other aspects of biology and behaviour. *D. S. Bertram*

GILLIES, M. T. **A New Character for the Recognition of Nulliparous Females of *Anopheles gambiae*.** *Bull. World Health Organization*. Geneva. 1956, v. 15, Nos. 3, 4 & 5, 451-9, 4 figs.

See WHO papers on malaria, above.

BRUCE-CHWATT, L. J. & SERVICE, M. W. **An Aberrant Form of *Anopheles gambiae* Giles from Southern Nigeria.** [Correspondence.] *Nature*. 1957, Apr. 27, v. 179, 873.

Specimens of *Anopheles gambiae* were collected at Abeokuta and Ibadan, 60 and 100 miles respectively from the coast of Nigeria. Eggs from these females and from the F_1 generation had the morphological characters of *A. g. melas* but their average size was greater than that of either *A. g. melas* or *A. g. gambiae*. The pecten of the fourth stage larvae was of the *A. g. gambiae* form and the salinity test showed that physiologically they were *A. g. gambiae*.

Results of crossings will be published later.

These observations show that separation of the two mosquitoes by the egg character alone is unreliable in some parts of West Africa.

H. S. Leeson

MAEGRAITH, B. G. **Some Physiological and Pathological Problems of Malaria.** *Ann. Soc. Belge de Méd. Trop.* 1956, Oct. 31, v. 36, No. 5 bis, 623-9, 1 fig. on pl.

This lecture was given in Antwerp in October 1956 on the occasion of the 50th anniversary of the School of Tropical Medicine and also of the 25th anniversary of the Prince Leopold Institute of Tropical Medicine.

The problem of the pathogenesis of malaria has been considered by studying the parasite in its normal environment and by the effect produced on the host tissues. It is reasonably assumed that development of the parasite in the red blood cell is the prime cause of pathological and physiological changes in the host and these changes centre around schizogony. It appears, at least in human malaria, that the supply of oxygen to the tissues is not seriously interfered with by the infection. Yet signs of anoxia are present early in the disease, due, the author believes, to failure of function of respiratory enzymes such as the cytochromes. [He might have included other respiratory enzymes such as pyridinoproteins, flavoproteins or copper-containing proteins.] The

substance responsible for inhibition of these enzymes may be of simple character and corresponds to the toxin postulated by various authors. The significance of loss of iron through red cell destruction, and the competition between host and parasite for essential substances, are considered largely unimportant. Because of local and general circulatory disturbances the liver is markedly affected, and shows centrilobular degeneration, probably as a result of constriction of the hepatic venous vessels at the site due to some undetermined cause. There is also a reduction in renal blood flow, which affects renal epithelium adversely and may cause failure of urinary secretion. Vascular obstruction may also arise in the brain. If the conditions persist long enough the changes caused are irreversible and give rise to patterns familiar at autopsy.

Recovery of monkeys infected with *P. knowlesi* from vascular collapse by the use of *l*-nor-adrenaline was demonstrated in a film. Brief reference to the importance of host environment on the parasite as affected by diet was also made.

J. D. Fulton

GILLES, H. M. **The Development of Malarial Infection in Breast-Fed Gambian Infants.** *Ann. Trop. Med. & Parasit.* 1957, Mar., v. 51, No. 1, 58-62, 1 graph. [20 refs.]

This well-conceived survey, carried out in 45 Gambian villages, demonstrates the mean malarial parasite rate in breast-fed infants by 2-monthly age-groups up to 6 months of age. The major survey was carried out during the season of intense malarial transmission from June to October, during which period blood from 100 infants in each of the three age-groups was examined by a thick-film technique, by means of Field's stain. A single film was taken from each infant, on one occasion only. At the same time, a further specimen was obtained for estimation of foetal haemoglobin by the well-known one-minute alkaline denaturation method. The parasite rates demonstrated were as follows:—

1st to 2nd months—parasite rate 10%

3rd to 4th months—parasite rate 42%

5th to 6th months—parasite rate 53%

A minor survey carried out in May, a dry month of minimal malarial transmission, gave the following parasite rates in smaller groups of infants of corresponding ages: 0%, 10.5% and 15.8%. This minor series was not considered further.

When the mean parasite rate for age was plotted on a graph showing also the mean proportion of foetal haemoglobin in the erythrocytes at the same ages, a striking inverse relationship was evident.

While this relationship is impressive, the author points out that the influence of two other possible protective factors cannot be discounted. Hypothetical maternal antibodies (demonstrated in the infant rat and maintained by suckling—see this *Bulletin*, 1954, v. 51, 884) might be

expected to decay after the first 2 months, while a developing intestinal flora might make available increasing amounts of para-aminobenzoic acid, essential for plasmodial metabolism. The concentration of this substance in the breast milk of Gambian mothers is known to be low.

The significance of the inverse relationship between malarial parasite rate (in this series all infections were with *P. falciparum*, associated with *P. malariae* in 1% of subjects only) and the proportion of foetal haemoglobin in the erythrocytes at any age up to 6 months, cannot be assessed until the results of *in vitro* experiments on the growth of plasmodia in red cells containing foetal or adult haemoglobin are known.

[See also ALLISON, this *Bulletin*, 1954, v. 51, 526.] J. H. Walters

See also p. 993, OOMEN, **The Relationship between Liver Size, Malaria and Diet in Papuan Children.**

NÖLLER, H. G. & ROHWEDDER, W. Beitrag zur Wirkung des 2,4-Diamino-5-P-Chlorphenyl-6-Äthyl-Pyrimidins (Daraprim) auf das RES. [Study of the Effect of 2,4-diamino-5-p-chlorphenyl-6-ethyl-pyrimidine (Daraprim, Pyrimethamine) on the Reticulo-Endothelial System] *Klin. Woch.* 1957, Apr. 15, v. 35, No. 8, 410-12.

Besides its use for malaria and toxoplasmosis, pyrimethamine has been employed for the treatment of polycythaemia rubra in doses of 25 mgm. per day. In the present work the effect of pyrimethamine on the reticulo-endothelial system in adult rats was investigated. Colloidal chrome phosphate labelled with ^{32}P was injected intravenously, 12 mgm. per 250 gm. rat, and the rate of disappearance of radio-activity from the blood during the next 6 minutes was measured. The rate of disappearance was taken as a measure of the ability of the reticulo-endothelial system to remove colloidal particles from the blood. Numerically the result was expressed as the time required for half the radio-activity to disappear, *i.e.*, the "half-life".

In 10 untreated rats the average "half-life" was 1.60 minutes (1.35-1.98). Other rats weighing 250 gm. were then given pyrimethamine by stomach tube once daily for 3 days. Two rats receiving 3×0.2 mgm. pyrimethamine had a half-life of radio-activity in the blood of 1.25 and 1.1 minutes when tested 24 hours after the last dose. Two rats receiving 3×1 mgm. showed a half-life of 0.85 and 0.8 minutes. Two receiving 3×5 mgm. showed a half-life of 1.05 and 1.1 minutes, and two which received 3×25 mgm. showed half-life of 1.95 and 2.2 minutes. Rats receiving 3×25 mgm. were in a subconvulsive state.

It is concluded that small doses (< 5 mgm.) of pyrimethamine stimulate the reticulo-endothelial system while large toxic doses (25 mgm.) depress it. Animals tested 10 days after the last dose of pyrimethamine showed no change in the half-life (*i.e.*, the reticulo-endothelial system

had completely recovered). If the rats were treated daily with 0.2 mgm. pyrimethamine for 30 days, there was no change in the half-life; therefore the reticulo-endothelial system returns to normal when exposed to these repeated low doses, although the first result may have been simulation.

F. Hawking

MONTAUBAN, STERCKX, P. & VAN LAER. Intoxication par absorption de Daraprim. [**Poisoning by Daraprim (Pyrimethamine)**] *Ann. Soc. Belge de Méd. Trop.* 1956, Dec. 31, v. 36, No. 6, 905-10, 2 graphs.

The authors, from Ruandi-Urundi, describe yet another fatal case of poisoning in a child who ate 48 tablets of pyrimethamine [for other references, see this *Bulletin*, 1957, v. 54, 264]. The course and treatment are described in detail. The child, who was aged $2\frac{1}{2}$, died some 18 hours after he had taken the tablets.

H. J. O'D. Burke-Gaffney

TIBURSKAYA, N. A. [**The Comparative Study of Gamostatic Action of Chloridin, Combination of Plasmocide with Cyclochin, and Chloridin with Cyclochin**] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 2, 202-8. [In Russian.]

The English summary appended to the paper is as follows:—

“ 1. Administration of chloridin [pyrimethamine] at a dosage of 0.05 g per day in the course of two days (3 cases), and also at a dosage of 0.03 g on the first day and of 0.02 on the second (2 cases), to patients suffering from tertian malaria has prevented transmission of the infection to mosquitoes feeding on these 5 patients. When using this method the gamotrophic effect was found 24 hours after the 1st dose was administered, i.e., before the administration of the 2nd dose of the preparation; this effect continued for not less than 120 hours.

“ 2. Administration of 0.05 g of chloridin together with 0.3 g of cycloquin per day on the first day, and of 0.3 g of cycloquin per day for the following days, has ensured a complete gamostatic effect in the case of the two patients under observation.

“ 3. In the case where 0.05 g of chloridin with 0.3 g of cycloquin was administered for 1 day one patient out of four transmitted infection to 3 out of 11 mosquitoes which were fed upon the blood of the patients after 24 hours. The average number of oocysts proved to be considerably smaller than was the case with mosquitoes fed before the preparation was administered.

“ 4. A complete gamostatic effect was produced on all the three patients when using one-day treatment with a total dosage of 0.1 g of chloridin and of 0.6 g of cycloquin per day in two doses with a 6-hour interval between them.

“ 5. Administration of a combination of plasmocide [pamaquin] at a dose of 0.06 g with 0.3 g of cycloquin pro die for 3 days did not produce the gamostatic effect.”

LYSENKO, A. I. [**In Search of Methods of Radical Chemoprophylaxis and Non-Relapse Cure of Tertian Malaria with Short and Long Incubation. Report IX. Results of the Use of Quinocide for Non-Relapse Cure and Radical Chemoprophylaxis of Tertian Malaria with Short Incubation**] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 2, 197-202. [In Russian.]

The English summary appended to the paper is as follows:—

“For non-relapse cure of tertian malaria with short incubation quinocide was administered to 3 groups of patients in Tadjikistan. During the period of first attacks quinocide was given at a dosage of 0.03 g daily during 10 days to 35 patients, who had only recently fell ill with malaria in July–September 1954. During the first 2–5 days the drug was administered together with chloridine or bigumal [proguanil]. Only one case of remote relapse 279 days after the primary attack was revealed. In the pre-relapse period, in April 1955, quinocide was given to 500 patients, who for the first time applied for help in July–December 1954. The drug was administered at a dosage of 0.03 g daily (for adult) during 10 days. Remote relapses occurred in six patients. In the third group quinocide was given to 197 patients, who had relapses in January–June 1955. The drug was administered at a dosage of 0.03 g daily during 10 days, or of 0.02 g per day during 14 days. Repeated relapses were noted in nine out of 129 patients who were given the preparation at a dosage of 0.03 g per day, and in one case out of 69 patients, who used the preparation at a dosage of 0.02 g per day.

“Quinocide in combination with chloridine was also used as a means of chemoprophylaxis of tertian malaria with short incubation. The entire population of two villages (313 people) in the course of June–September of 1954 were given 0.01 g of chloridine once a week. There were no cases of tertian malaria during the period of prophylaxis. In May 1955, part of the population (148 people) were given quinocide at a dosage of 0.02 g daily during 14 days. There was not a single case of late manifestations of the disease in the course of the nearest 4 months. In the control group 4 people fell ill in May–June 1955, and it is certain that they were infected in the epidemic season of 1954.”

[See also this *Bulletin*, 1956, v. 53, 16.]

FLOCH, H. La lutte contre l'importation du paludisme en Guyane Française. [**Control of Imported Malaria in French Guiana**] *Riv. di Malariologia*. 1956, Dec., v. 35, Nos. 4/6, 209-14.

The author describes measures to combat the importation of *Plasmodium falciparum* infection into French Guiana by immigrants from St. Lucia.

A group of 20 malaria patients were treated each with a single dose of 600 mgm. of Flavoquine (amodiaquine). Clinical cure was obtained, and in 19 of the patients asexual parasites disappeared from the blood within 8 days; but in 9 gametocytes were still present, so that they remained infective to mosquitoes.

Another group of 44 patients each received 3 capsules containing 200 mgm. of Flavoquine and 20 mgm. of Rhodopréquine, which is a mixture of the 8-aminoquinolines Rhodoquine and Praequine [pamaquin]. On the 8th day after treatment and at regular intervals afterwards blood smears were found free from both schizonts and gametocytes.

Thereafter a routine treatment of 600 mgm. of Flavoquine plus 60 mgm. of Rodopréquine was administered in 4 weekly doses, and during 1955 273 immigrants received this treatment. Parasitological and clinical tests made during the following months were uniformly negative. In spite of the rather high dosage, no toxic effects were observed.

[See also this *Bulletin*, 1957, v. 54, 130.]

G. Covell

LOZANO MORALES, A. Hacia la erradicación del paludismo en las regiones europea y Mediterráneo oriental. (Conferencia de Atenas. 10-19 de junio de 1956.) [**Towards Malaria Eradication in Europe and the Eastern Mediterranean**] *Rev. Sanidad e Hig. Pública*. Madrid. 1956, Sept.-Oct., v. 30, Nos. 9/10, 660-71.

RAFFAELE, G. & COLUZZI, M. Esperienze sulla resistenza al DDT delle specie di anofeli di varie regioni d'Italia. [**Studies on Resistance to DDT in Anopheline Species from Different Parts of Italy**] *Riv. di Malariologia*. 1956, Dec., v. 35, Nos. 4/6, 177-98, 4 figs. [15 refs.] English summary.

The widespread use of DDT house spraying in the malarial districts of Italy has resulted in virtual eradication of the disease. The vector mosquitoes have been largely excluded from houses and their numbers sometimes reduced; for example, *Anopheles maculipennis labranchiae* has been eradicated from the Tyrrhenian coast, though it is still present along the Ionian and Adriatic sea-board. The authors were interested to know whether the resistance of the mosquitoes had changed as a result of this extensive use of DDT. They used the method of BUSVINE and NASH [this *Bulletin*, 1953, v. 50, 1176] first, as recommended by the WHO Expert Committee on Malaria; but later they exposed the mosquitoes to residues of DDT from xylene, without the Risella mineral oil.

The tests were done at different times and places on half a dozen kinds of mosquito. Since some species were rare in sprayed areas, they were collected from untreated shelters "baited" with a pig. The specimens

used were all females either blood-fed or maturing eggs. They were exposed individually and kept afterwards singly in tubes with damp filter paper, being handled with great care. All "controls" survived 24 hours.

The mortalities in tests were all low. With Risella oil, 2% DDT killed 21% *A. m. labranchiae* and 16% *A. sacharovi*. Without oil, 2% DDT in xylol gave the following kills: *A. m. labranchiae* 37, 37 and 24%; *A. sacharovi* 25%; *A. superpictus* 89, 26, 79%; *A. m. atroparvus* 32%; *A. m. maculipennis* 22, 13, 10-22%; *A. claviger* 48, 40%.

These figures greatly surprised the authors; they seemed to indicate high resistance, but this was contradicted by the good results observed in the field, as mentioned earlier. They do not believe that these could be explained by a permanent change in habits, since the endophilic species still come readily into untreated shelters.

[The existence of a resistant strain can only be proved by comparative data, showing a change in time or from one place to another, in the susceptibility of a given species. The low kills obtained are indeed remarkable, but may be due to the authors' technique: *e.g.*, the exposure of individuals singly in the treated tubes.]

J. R. Busvine

LYSENKO, A. I., LAVRENKO, E. M., ILYASHENKO, L. I. & KOROVAI, A. F. [Antimalarial Efficacy of Treatment of Farm Animals by DDT in a Mountain Region of Tadzhikistan] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 2, 212-18, 2 figs. [In Russian.] English summary.

BANDIN, A. I. [Advantages of Treatment of Farm Animals by Contact Insecticides in Comparison with Treatment of Premises in combating *Anopheles*] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 2, 208-12. [In Russian.] English summary.

SERGEANT, Ed. & PONCET, Alice. Note sur la résistance innée à *Plasmodium berghei* de gerbilles de l'Afrique du Nord. [Note on the Innate Resistance of North African Gerbils to *Plasmodium berghei*] *Arch. Inst. Pasteur d'Algérie*. 1956, Dec., v. 34, No. 4, 494-5.

Three adult *Dipodillus campestris* weighing between 27 and 30 gm. were inoculated intraperitoneally with about 35 million *Plasmodium berghei* parasites. The following day very rare parasites were found in the blood of the 3 gerbils, but they then disappeared and when the animals were killed 40 to 50 days later, parasites were still undetectable even after inoculation of suspensions of organs, bone-marrow and blood into 21 white mice and rats.

P. C. C. Garnham

SERGEANT, Ed. & PONCET, Alice. Étude expérimentale de l'association chez le rat blanc de la spirochétose hispano-nord-africaine et du paludisme des rongeurs à *Plasmodium berghei*. [**An Experimental Study of the Association in the White Rat of Spanish-North African Relapsing Fever and the Malaria of Rodents due to *Plasmodium berghei***] Arch. Inst. Pasteur d'Algérie. 1957, Mar., v. 35, No. 1, 1-23, 2 graphs. [Refs. in footnotes.]

This paper gives a detailed account of experiments of a kind similar to those described previously [see this *Bulletin*, 1955, v. 52, 642]. The present authors have not, however, found that in the case of *Spirochaeta hispanica* and *Plasmodium berghei* in white rats, any appreciable influence of one infection on the development of the other could be demonstrated. In addition to studies on 114 white rats they inoculated 2 guineapigs that had recovered from an infection of *Spirochaeta hispanica* with heavy doses of *Plasmodium berghei* without producing any attack of malaria or spirochaetal relapse. The results are shown in numerous tables.

Edward Hindle

YOELI, M. **Some Aspects of Concomitant Infections of Plasmodia and Schistosomes. I. The Effect of *Schistosoma mansoni* on the Course of Infection of *Plasmodium berghei* in the Field Vole (*Microtus guentheri*).** Amer. J. Trop. Med. & Hyg. 1956, Nov., v. 5, No. 6, 988-99, 8 figs.

The field vole (*Microtus guentheri*) was exposed to infection with *Schistosoma mansoni* (maintained in *Australorbis glabratus* and hamsters) and *Plasmodium berghei* together and separately. The schistosomal infection was first studied alone in 18 voles sacrificed at various intervals from 1 to 22 weeks after receiving 100 cercariae. The liver of a normal vole sometimes shows small areas of periportal infiltration, but this was much more marked in infected animals after the 4th week; after 6 weeks with the appearance of eggs in the organ, considerable local tissue reaction was found with pseudotubercle formation and coagulation necrosis, but no generalized fibrosis. Eosinophilia reached a peak of 24% about the 5th week and dropped to 3-5% after the 7th week. The course of *P. berghei* infection in voles is usually mild (78%) and ends in latency or complete cure; the animals sometimes die (22%) with an intense parasitaemia.

30 animals were infected with both parasites, 5 with *P. berghei* first and 25 with *P. berghei* 5 to 48 days after exposure to cercariae. The presence of a schistosomal infection caused a considerable prolongation of the malaria, particularly in animals infected with *P. berghei* just before or just after exposure to cercariae, and the voles appeared to be unable to suppress or exterminate the blood parasites under these conditions. Later, however, with an "alerted reticuloendothelial system" the voles were in a better position to withstand the malaria and no deaths occurred in 14

such animals while 5 of them showed no parasites at all. The pathological changes in the liver were little enhanced by the presence of the 2 infections, except in one fatal case where a generalized early cirrhosis was found.

P. C. C. Garnham

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—human, animal; American—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

COLONIAL OFFICE. **Colonial Research 1955–1956. Tsetse Fly and Trypanosomiasis Committee. Report for 1955–1956** [MONSON, W. B. L., Chairman] (pp. 275–90). Cmd. 52. 312 pp. 1956, Nov. London: H.M. Stationery Office. [10s.]

This report indicates briefly the lines on which investigations have proceeded during the year ended 31st March 1956. Details must be sought in the papers published by members of the organizations in East and West Africa, references to which are listed.

In accordance with the terms of reference, the Committee is concerned with animal as well as with human trypanosomiasis and the most pressing subject was the situation arising from the advent of new trypanocidal drugs for the treatment of domestic animals. It is felt that a new phase has begun in the control of bovine trypanosomiasis.

Work on arboricides and herbicides has given disappointing results. Some other points of interest are summarized below.

In East Africa, studies on the food supply of tsetse flies show that different species tend to prefer certain hosts while some common game animals are probably neglected. Improved techniques have made it possible to catch both sexes of flies in approximately their natural existing proportions and also to catch recently fed flies.

Since 1950, the density of *Glossina pallidipes* in the Lambwe Valley, Kenya, has increased and investigations have started into methods of catching by traps and by fly-boys. Also in Kenya field work may show that dieldrin is more effective than DDT against tsetse flies, and that *G. austeni* can be controlled by cutting down undergrowth, thus increasing light intensity and raising temperature.

In Uganda, the service for identifying the sources of food of wild tsetse flies has confirmed that the hippopotomus is an important food-host for *G. brevipalpis*. Results are being prepared for publication of investigations into the natural infections of *G. palpalis* and *G. pallidipes* and on the early development of trypanosomes in the mammal.

In Tanganyika, the Tinde strain of *Trypanosoma rhodesiense* which has not lost its infectivity to man after 18½ years, has shown changes in behaviour which have been statistically analysed. At Urambo, the incidence of both human and animal trypanosomiasis has fallen as a result of successful advisory work. At Tabora, a sleeping sickness ward is being set up for the treatment and clinical study of human cases.

In Northern Rhodesia, one fly-infested area of 200 square miles, which was reduced by discriminative clearing to 25 square miles, has received 5 sprayings of 1% BHC, causing a reduction of the fly of 99%; a similar result was achieved in another area.

In West Africa, trials with Melarsen have shown that in human trypanosomiasis the individual dose should not exceed 20 mgm. per kgm. (maximum 1.5 gm.), the injections being given at 5-day intervals to a maximum of 12, and that only minor toxic effects have been noted. Among patients treated with Melarsan only, and followed up for 2 years, results have been good.

In work on animal trypanosomiasis, the Ilorin strain of *T. vivax*, which has been maintained in rats for 4 years, has now lost its infectivity to sheep and is now no longer transmissible through *G. palpalis*.

To obtain the highest infection and survival rates with *G. palpalis* and *T. vivax* it is recommended that pupae be incubated at 28°C. and flies be kept at 23°C. The trypanosome development cycle should then be 12–13 days or less. A quicker cycle could be obtained by keeping the flies at 28°C.

Differences in the behaviour of *G. palpalis* in the north and in the south of Nigeria suggest that lack of close, personal man-fly contact may be a reason for the rarity of sleeping sickness in Southern Nigeria.

Dissections of wild male *G. longipalpis* gave an infection rate of 21% in 1,742 flies of which 82% were *T. vivax* and 18% were *T. congolense* infections. In the *fusca*-group (*G. tabaniformis*, *G. fusca*, *G. nigrofusca* and *G. medicorum*) infection was highest in *G. nigrofusca* at 30%. *G. tabaniformis* was most frequently captured but showed only 5% infected out of 372 specimens. Incidentally, 7 specimens of the newly described *G. nashi* were also collected.

A 2 years' study of obstructional clearing suggests that the fly is unable to re-establish itself even if it gets a temporary foot-hold in the wet season. Another 1½ miles was cleared in 1955 and showed no wet season immigration.

In the laboratory, the monthly production of pupae of *G. palpalis* averaged 4,900; 12,923 pupae were supplied to other workers.

An account of the work being done on the tsetse flies of Southern Nigeria and a guide to West African species of the *fusca*-group are being prepared.

[For the 1954–55 Report, see this *Bulletin*, 1956, v. 53, 413.]

H. S. Leeson

FULTON, J. D. & SPOONER, D. F. **Inhibition of the Respiration of *Trypanosoma rhodesiense* by Thiols.** *Biochem. J.* 1956, July, v. 63, No. 3, 475-81. [37 refs.]

These workers have confirmed the observation of STRANGWAYS [see this *Bulletin*, 1938, v. 35, 346] that the respiration and mobility of trypanosomes are, in the absence of red corpuscles, inhibited by thiol compounds—in this instance BAL (2:3 Dimercaptopropanol), cysteine, glutathione and penicillamine (dimethylcysteine), and that this inhibition is produced by hydrogen peroxide formed in the oxidation of the thiol compounds.

They have shown in addition that in suspensions of trypanosomes the peroxide is destroyed, not, as might be supposed, by catalase, which trypanosomes do not appear to possess, but by metabolic products, of which pyruvic acid is most likely to be involved. *W. E. Ormerod*

BURSELL, E. **The Effect of Humidity on the Activity of Tsetse Flies.** *J. Exper. Biol.* 1957, Mar., v. 34, No. 1, 42-51, 1 fig. [17 refs.]

Using mainly *Glossina morsitans*, the author carried out laboratory experiments to observe the effect of humidity on the fly's general activity. Activity was measured by recording at 10-minute intervals over several hours the position of flies on a grid in chambers of either nil or 98% relative humidity.

The tsetse was found to be more active in dry air than in wet, the intensity increasing with progressive desiccation. The response ceased at low light intensities. Branched hairs guarding the aperture of the thoracic spiracles are the sense organs responsible for perceiving the humidity changes.

Subsidiary observations with *G. swynnertoni*, *G. austeni*, *G. pallidipes* and *G. palpalis fuscipes* gave similar results, with *G. pallidipes* distinctly more active in dry air than the other species of the *morsitans*-group. *G. p. fuscipes* was more active than the *morsitans*-group in dry and in wet air but this is probably an expression of restlessness of a forest fly in the bright light of the experiments.

These experiments are part of other studies on the natural perching places of tsetse fly. It is suggested that in a confined site in still air a fly may, by its own water loss, maintain about itself a high humidity which will induce resting. But, if its water loss is dissipated rapidly in an exposed site, the dry air will tend to stimulate activity, causing movement to another site.

D. S. Bertram

BURSELL, E. & JACKSON, C. H. N. **Notes on the Choriothete and Milk Gland of *Glossina* and *Hippobosca* (Diptera).** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1957, Apr. 18, v. 32, Pts. 1/3, 30-34, 1 text fig. & 1 pl.

GALL, D. **Blood Protein Changes in Sleeping Sickness.** Reprinted from *J. West African Sci. Ass.* 1956, Aug., v. 2, No. 2, 152-7.

This lecture given before an audience of non-medical scientists describes some of the immunological problems of human trypanosomiasis, on which the author has been working in West Africa. It is pointed out that little is yet known of the mechanism by which the trypanosome invades the tissues, or of the causation of symptoms.

The constant finding of very high erythrocyte sedimentation values in human patients (a median value of 114 mm. in an hour, as opposed to values up to 70 mm. in village populations not affected by trypanosomiasis) was demonstrated as being due to alteration in the plasma constituents, not in the quality of the erythrocytes, which fell at a normal rate in healthy plasma. This capacity for agglutination is not due to the presence of cold agglutinins, but is associated with a striking increase in the gamma globulin fraction, which rises quickly to between 3 and 6 gm. per 100 ml.; at the same time the albumin concentration falls. Electrophoresis showed the presence of a protein fraction rising between the beta and gamma peaks, which is suggestive of liver cell damage.

Maclagan's thymol turbidity index showed an abnormal level in over 90% of patients; in experimentally infected monkeys a sharp rise was shown as early as the 7th to 10th day.

The nature and function of this augmented gamma globulin is unknown; since the disease is rarely self-limiting in man it is probably not specific antibody. It must reflect fundamental changes in the reticuloendothelial tissue, elements of which are markedly increased in the liver and spleen early in the infection. It is possible that by analogy with kala azar, the trypanosome undergoes a cycle of development hitherto undetected within the reticuloendothelial cells. Despite the turmoil engendered in the defensive mechanism of the body by the invading trypanosome, little effective resistance is forthcoming.

[An interesting and provocative article.]

J. H. Walters

VAN BOGAERT, L. De quelques aspects neurologiques de la trypanosomiase africaine. [**Some Neurological Aspects of African Sleeping Sickness**] *Ann. Soc. Belge de Méd. Trop.* 1956, Oct. 31, v. 36, No. 5 bis, 645-54.

This contribution is one of a series on various subjects presented by distinguished workers on the occasion of the 50th Anniversary celebration of the Prince Leopold Institute of Tropical Medicine at Antwerp. It is of a general nature, rather than a report on a piece of work. It is concerned with the clinical and the anatomical changes resulting from central nervous system involvement in trypanosome infections.

From the studies of the author himself and his associates, and those of other workers, some generalizations can be made on sleeping sickness of man. There is very great variety in the motor and psychomotor syndromes due to trypanosomiasis, and the distinction between motor signs attributable to torpor and somnolence and those due to organic lesions within the central nervous system is extremely difficult and needs the most exacting investigation. Despite their variety the pattern of the motor changes in the extremities in sleeping sickness has, in the author's experience, been exceeded only by those seen in subacute cases of sclerosing leuco-encephalitis. Such changes as facial and segmental athetosis, thoraco-abdominal bradykinesia with associated respiratory troubles, and epilepto-myoclonic or ataxo-cerebellar syndromes tend to dominate the picture in sleeping sickness by virtue of their pronounced character and their persistence. Details are given of some cases illustrating these points, and at the reading of the paper a film was presented visually depicting these features of the disease in the cases concerned.

A. R. D. Adams

COLLOMB, H. & LEVRON, M. Diabète transitoire après traitement à la lomidine. [**Transient Diabetes after Lomidine Treatment**] *J. Méd. de Bordeaux*. 1957, Apr., v. 134, No. 4, 453-6.

See this *Bulletin*, 1957, v. 54, 403.

EDWARDS, E. E., JUDD, J. M. & SQUIRE, F. A. **Observations on Trypanosomiasis in Domestic Animals in West Africa. III.—The Haematological Changes produced in Horses by Infections of *Trypanosoma vivax*, *T. congolense* and *T. brucei*.** *Ann. Trop. Med. & Parasit.* 1957, Mar., v. 51, No. 1, 63-79, 5 figs.

JAKIMOWSKA, Krystyna & JANOWIEC, M. Działanie przeciwtrypanosomowe chlorowodorku 3-amino-4-hydroksyfenylodwuchloroarsenu na myszkach białych. [**Rapid Antitrypanosomic Activity of 3-Amino-4-Hydroxyphenylodichlorarsenic Hydrochloride in White Mice**] *Med. Dośw. i. Mikrob.* Warsaw. 1957, v. 9, No. 2, 195-200.

The English summary appended to the paper is as follows:—

“A method used to determine rapid antitrypanosomic activity of 3-amino-4-hydroxyphenylodichlorarsenic hydrochloride was described. Series 2-703/56 of the preparation (made in Poland) was used as standard.

“It was demonstrated that the chemotherapeutic activity of the doses did not depend on the route of inoculation (intravenous, intraperitoneal or subcutaneous).”

VERAIN, A., VERAIN, Alice & LE FILLIATRE, Marie. Influence des ultrasons sur *Trypanosoma equiperdum*. [**Effect of Ultrasonic Waves on *Trypanosoma equiperdum***] *C.R. Soc. Biol.* 1956, v. 150, Nos. 8/9, 1529-30.

A description is given of the effect of ultrasonic waves produced by Dutertre's "Mégatone" apparatus (frequency 1 MHz, maximum power 4w/cm²) upon *Trypanosoma equiperdum*. Tubes with the blood of an infected guineapig were placed in a rubber muff containing water, through which the ultrasonic beam was transmitted, and subjected to its action for from 3 to 30 minutes. The results were assessed by examination of fresh and stained blood films, and by inoculation of rodents with the treated blood.

In the initial stages of exposure to ultrasonic waves the movements of the trypanosomes became more rapid and disorderly; after 20 minutes some were still motile, but smaller and thinner than normally; while other trypanosomes were in the process of breaking up, until after 30 minutes only their detached nuclei and protoplasmic agglomerations were left. As regards the infectivity of the trypanosomes, after exposure to ultrasonic waves for 5-15 minutes they still produced a fatal infection, characterized by a rapid increase of parasitaemia; however, after 20-30 minutes no infection was produced or very atypical forms appeared in the blood.

C. A. Hoare

MARSBOOM, R. **Epizootological Observations and Contribution to the Study of the Treatment of Bovine Trypanosomiasis in the Bush (Muhinga-Ngozi Sector in Urundi)**. *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase No. 209/T* [Léopoldville (Congo Belge)]. 16 mimeographed pp., 5 maps (1 folding), 1 chart & 11 folding pp. of tables. (Dated Muhinga, March 1956.)

See also p. 1028, MOÇAMBIQUE, Missão de combate às tripanossomíases. Relatório anual de 1954. [**Annual Report for 1954 of the Trypanosomiasis Commission**]

DE CARVALHO, A. G. & VERANO, O. T. Contribuição ao conhecimento da distribuição geográfica dos triatomídeos domiciliários e de seus índices de infecção natural pelo *Schizotrypanum cruzi*, na região do Planalto Central (Retângulo de Cruls), Estado de Goiás, Brasil. [**Geographical Distribution of Domiciliary Triatomids and Indices of their Natural Infection with *T. cruzi* in the Central Plateau Region, Goiás, Brazil**] *Rev. Goiana Med.* 1956, July-Aug.-Sept., v. 2, No. 3, 181-200, 4 figs. [13 refs.] English summary.

PICK, F. & SAENZ, A. Jr. Les cristallisations réduvidiques de l'hémoglobine du *Mesocricetus auratus*. [**Crystallization of Haemoglobin from *Mesocricetus auratus* by Reduvid Bugs**] *Ann. Parasit. Humaine et Comparée*. 1957, Jan.-Mar., v. 32, Nos. 1/2, 5-8, 5 figs.

First instar nymphs of *Triatoma infestans* which had received a single blood meal from the rodent *Mesocricetus auratus* failed to elaborate haemoglobin crystals during a subsequent period of 4 weeks; this was considered due to a peculiar corpuseular resistance to enzymatic haemolysis. During the fifth week crystallization occurred, and was in two forms, *viz.* (1) single rhomboid or hexagonal crystals, (2) clusters of giant elongate crystals, arranged in "sheaves". The latter were of two types which appeared to correspond with the differing isolated crystals, being truncate or oblique apically. (These crystal types are all illustrated in photomicrographs.)

Mechanical destruction of the erythrocytes in a blood meal, 24 hours after ingestion, resulted in haemoglobin crystals a day later. These crystals elaborated during the following week to form giant crystal clusters consisting of the two types mentioned above.

[See this *Bulletin*, 1954, v. 51, 157.]

N. R. Phillips

GEIGY, R. Analyse de l'acte hématophage chez *Rhodnius prolixus*. [**Analysis of Haematophagy in *Rhodnius prolixus***] *Ann. Soc. Belge de Méd. Trop.* 1956, Oct. 31, v. 36, No. 5 bis, 617-21, 1 diagram.

This paper, which is a printed version of the sound commentary to a film shown at the Prince Leopold Institute of Tropical Medicine, Antwerp, constitutes a physiological analysis of haematophagy based upon neurosensory relationships. The behaviour of *Triatoma infestans*, in response to external stimuli, has recently been investigated by WIESINGER [this *Bulletin*, 1956, v. 53, 1228]; in *Rhodnius prolixus*, a precisely similar behaviour sequence was correlated with the innervation of the organs involved.

By means of a microsurgical technique involving systematic nerve resection, the levels at which individual innervations are involved in inhibiting the normal behaviour sequence were schematized; this is shown in tabular form. After resection of the antennary nerves or of the cerebral ganglion, all stages in the sequence were inhibited with the exception of individual movement of the mandibles and maxillae, and the exudation of saliva. Loss of the labial innervation permitted orientation and body flexion of the insect, but projection of the proboscis and all allied subsequent stages were prevented. Loss of the frontal nerve inhibited only the final pharyngeal pumping action, and resection of the labral nerves and optic lobes failed to impair the sequence at any level.

On the basis of these observations, a scheme of probable neurophysiological inter-relationships is presented; this is shown diagrammatically and is briefly discussed.

N. R. Phillips

FLOCH, H. & BOULAN, Suzanne. Observations sur la maladie de Chagas. [**Observations on Chagas's Disease**] *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 811-14.

The authors add 2 more cases of Chagas's disease occurring in French Guiana to the 6 previously reported. Both cases were confirmed by xenodiagnosis, *Trypanosoma cruzi* being obtained from the faeces of the *Rhodnius prolixus* which had been fed on the patients, after intervals of 5 months and 15 days respectively.

The disease in the first patient aged 11 years ran a mild course and he was removed from the hospital before the diagnosis was established. The second patient aged 12 years was very ill and was also suffering from cirrhosis of the liver. He was treated with 8-aminoquinolines (Rodo-préquine). The fever at first settled but after 10 days there was a sharp relapse followed by convulsions and death. It is concluded that death was due to the cirrhosis of liver which the authors attributed to alcoholism.

The clinical features of the cases described were characteristic. The authors consider that conditions favouring the occurrence of the disease exist in French Guiana but that it is usually chronic and mild, and as the total population is only 28,000 opportunities for observing the disease are limited.

Frederick J. Wright

ISASI, E. J. & CORREA DURÁN, A. Miocarditis chagásica crónica. [**Chronic Myocarditis of Chagas's Disease**] *Arch. Uruguayos de Med., Cirug. y Especialidades.* 1956, Oct.-Nov.-Dec., v. 49, Nos. 4, 5 & 6, 186-209, 9 figs. [25 refs.]

The English summary appended to the paper is as follows:—

“Two cases of chronic myocarditis chagastica are presented with complete study from the clinical electrocardiographic radiological and humoral point of view.

“Epidemiological considerations are made of etiological diagnostic, electrocardiographic and radiological methods.

“The clinical and humoral evolution in both observations are detailed.

“The result and suggestions obtained with the experiment of the arsenicals in the treatment of the myocarditis chagastica in its chronic phase are enumerated.”

KOBERLE, F. Patogênese dos megas. [**Pathogenesis of the “Megas”**] *Rev. Goiana Med.* 1956, Apr.-May-June, v. 2, No. 2, 101-10. [21 refs.]

The English summary appended to the paper is as follows:—

“It was demonstrated, with the Chagas' disease, the mechanism of production of dilatations of muscular hollow organs as a consequence of injury of the intramural plexuses. The achalasia of the sphincter which

may result from this lesion is a secondary factor, but not the determining factor, seeing that there are 'megacolon' produced in segments of digestive tract without sphincters.

"The principal factor is an alteration of the motility of the organ, due to the destruction of the nervous tissue of the muscular wall leading in the initial phase, to hypertrophy and hypertony of the wall. This phase evolves to the enlargement and complete atony of the organ.

"The congenital 'megacolon' have an etiopathogeny completely different from the acquired 'megacolon' and should be included among the malformations of the colons, since they represent a form of microcolon."

PINOTTI, M. Campanha contra a doença de Chagas. [**The Campaign against Chagas's Disease in Brazil**] *Rev. Brasileira Med.* Rio de Janeiro. 1956, Aug., v. 13, No. 8, 611-15.

This extends the information contained in a previous paper by the author [this *Bulletin*, 1956, v. 53, 166] and brings the data up to 1955, after which the National Service of Malaria in Brazil was incorporated in the National Department of Rural Endemic Diseases.

Tables show the geographical distribution of domestic triatomids for the years 1950-1955 in several States and localities, the number of towns in which each of 13 species of bug was found, the infection rate in each, the results of complement-fixation tests in each State and the number of houses sprayed in the different areas.

Of 109,385 bugs examined, 23.4% were infected. Of 18,388 complement-fixation reactions, 19.9% were positive, the highest percentage being in Minas Gerais (46.5) and the lowest in Santa Catarina (3.12).

The relation of Chagas's disease to cardiopathies is being studied extensively, both in hospital patients in general and in those giving a positive complement fixation for Chagas's disease: electrocardiographic tracings are made and their significance studied. So far, it would appear that Chagas's disease is not a frequent cause of heart disease in Rio Grande do Sul, contrary to what occurs in some areas of Minas Gerais and São Paulo.

Insecticides are discussed briefly. Rhodiatox is effective against the bugs, but has the usual dangers and disadvantages of organic phosphates. Dieldrin has a long residual effect, but is rather more toxic than BHC, which is now the routine insecticide used. In 1955, 268,451 houses were sprayed.

H. J. O'D. Burke-Gaffney

LESSER, E. & LUKEMAN, J. M. **Stomach Infections with *Trypanosoma cruzi*.** [Research Notes.] *J. Parasitology.* 1957, Feb., v. 43, No. 1, 65, 3 figs.

The authors, in Texas, examined at autopsy 30 Swiss albino mice which had been experimentally infected with *Trypanosoma cruzi*. In some of

them, blood smears were negative, but in all animals necrosis of the upper third of the stomach was noted. Histological examination showed leishmanial forms in the serosa and in the muscle layers; these forms were also found in the muscles of the heart, oesophagus and small intestine. The histological appearances are illustrated by 2 photomicrographs.

PORTO [this *Bulletin*, 1956, v. 53, 1105] suggested that the stomach is involved in Chagas's disease. The evidence in mice supports this hypothesis, but further studies are needed to determine whether stomach involvement is restricted to certain strains of *T. cruzi*.

In the meantime it is recommended that in endemic areas *T. cruzi* should be considered as a possible aetiological agent in otherwise unexplained gastric disturbances.

H. J. O'D. Burke-Gaffney

GREWAL, M. S. **Pathogenicity of *Trypanosoma rangeli* Tejera, 1920 in the Invertebrate Host.** *Exper. Parasit.* New York. 1957, Mar., v. 6, No. 2, 123-30, 1 fig. [22 refs.]

Trypanosoma rangeli, in contrast to *T. cruzi*, was shown to be pathogenic to its vector under experimental conditions. First instar nymphs of *Rhodnius prolixus* were fed upon animals whose blood contained flagellates, and their subsequent survival rate recorded. Of 120 nymphs thus infected, those reaching subsequent instars numbered 85, 77, 58, 51 and 41 (adults). Failure to moult, or death, were responsible for this decline; about twice as many nymphs failed to moult as died in each instar. Infection was eventually confirmed in all bugs used; gut infections approximately equalled haemolymph infections in nymphs which failed to reach successive instars, but gut infection was almost exclusive in those surviving to the adult stage. A smaller and variable proportion of salivary gland infections occurred in all instars. Failure to moult and death were apparently markedly correlated with haemolymph or salivary gland infection or both. The initial death rate of first instar nymphs was found to increase with increasing parasitaemia of the infecting blood meal.

Experimental infection of *Cimex lectularius* indicated a higher pathogenicity (80%) than in *R. prolixus*, and was correspondingly greater with increased donor parasitaemia. Invasion of the haemolymph occurred in 4 to 11 days and death ensued in 8 to 12 days. As in *R. prolixus*, mortality was correlated with the degree of haemolymph invasion, and bugs which reached the adult stage subsequently survived well.

Direct haemocoele inoculation of *R. prolixus* confirmed that mortality was not due to penetration of the gut wall; pathogenicity was associated with invasion of the haemolymph cells, within which leishmanial forms occurred. Inhibition of ecdysis appeared to be due to utilization of amino-acids by the parasite.

Pathological changes in *R. prolixus* associated with *T. rangeli* parasitization comprised (1) a "milky" appearance of the haemolymph when infected, (2) replacement of the normal pink colour by white in invaded salivary glands.

N. R. Phillips

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

RIGG, A. **Kala-Azar in a Child of Five Years.** *Med. J. Australia.* 1957, Mar. 23, v. 1, No. 12, 389-91, 1 fig.

"1. An historical note is given concerning the discovery and naming of kala-azar.

"2. The history of the disease in a girl, aged five years, is described, showing the transitory improvement that occurred following four courses of pentamidine isethionate, and finally the considerable improvement which followed splenectomy."

COLAS-BELCOUR, J. & RAGEAU, J. Sur la présence de phlébotomes en Allier. [*Phlebotomus in the Allier Department*] *Bull. Soc. Path. Exot.* 1956, Nov.-Dec., v. 49, No. 6, 1116-20, 1 fig. [16 refs.]

The following is a translation of the authors' summary:—

Phlebotomus perniciosus and *P. mascittii* have been found in the Allier Department and their presence is related to local climatic conditions at the time of their capture. Interest in the existence of *P. perniciosus* in the Department is heightened by the diagnosis by J. PRAT of a case of autochthonous canine leishmaniasis, as *P. perniciosus* is a vector of this disease.

The distribution in France of these 2 species of *Phlebotomus* is shown.

John Rathborn

MANSON-BAHR, P. E. C. & HEISCH, R. B. **Studies in Leishmaniasis in East Africa. III. Clinical Features and Treatment.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Sept., v. 50, No. 5, 465-71. [21 refs.]

These observations were made on 40 patients suffering from kala azar seen in a temporary hospital at Tseikuru, in the Kitui District of Kenya, where there was an outbreak of kala azar [this *Bulletin*, 1955, v. 52, 520].

The patients were mostly aged 6 to 20 years; 31 were males. They had usually been ill for 3 to 4 months before they were seen. The most common complaint was pain and discomfort below the left costal margin due to an enlarged spleen, occurring in 36 patients, 22 had febrile symptoms, and 24 a cough; other complaints were epistaxis (17), diarrhoea (11), and tinnitus (8).

The temperature was 101–102° F. in 10 patients and between 99° and 100° F. in 21; 9 patients were afebrile. The spleen was enlarged 2 to 8 inches below the costal margin in all patients and the liver slightly enlarged in 34. The lymphatic glands were enlarged in most cases, the posterior cervical in 13, axillary in 35, inguinal in 35 and femoral in 30. The heart and the nervous system were seldom affected but the blood pressure was almost invariably low.

A considerable degree of normocytic orthochromic anaemia was usually present, only 11 patients having more than 9 gm. of haemoglobin per 100 ml. The leucocyte count was below 3,000 per cmm. in half the cases and above 5,000 in 7. Granulopenia was the rule, and the polymorphonuclear count was above 50% in only 6 cases.

The formol-gel (aldehyde) test was positive in every case within 3 months of the onset of the disease. Parasites were never seen in the peripheral blood. The spleen smear showed parasites in 39 of the 40 cases, the liver in 18 of 19 cases, the glands in 20 of 31 cases, and the bone-marrow in 14 of 18 cases.

In 5 cases small irregular hyperpigmented areas, 0.5 cm. to 6 cm., often with a central depigmented scar, were observed on the legs; a few or many leishmaniae were found in smears in all these. It was considered possible that these were either healed primary ulcers, or traumatic ulcers in which leishmaniae had subsequently invaded. No instances of post-kala-azar dermal leishmaniasis were observed in this series.

The most effective course of treatment appeared to be a course of pentamidine isethionate followed by one of Pentostam [sodium stibogluconate]; the adult course of the former was 10 daily intramuscular injections amounting in total to 2.0 gm., and of the latter 10 daily intramuscular injections of 4 ml. each. Of 28 patients treated this way, 13 were found to be cured and 15 still to have enlarged spleens, 1 to 2 years later. However, among 12 of the latter only 1 showed a positive formol-gel reaction and 1 out of 6 a positive spleen puncture. Urea stibamine was also used and was found to be very effective. [The dosage employed was on the conservative side; KIRK's successes with Pentostam in the Sudan were achieved with much higher dosages.]

L. E. Napier

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

- WEISS, E., DRESSLER, H. R. & SUTOR, E. C., Jr. **Selection of a Mutant Strain of *Rickettsia prowazeki* Resistant to *p*-Aminobenzoic Acid.** *J. Bacteriology*. 1957, Mar., v. 73, No. 3, 421–30, 8 figs. [20 refs.]

Serial passage of *Rickettsia prowazeki* (Madrid E strain) in chick embryos which had received injections of 0.5–3 mgm. of *p*-aminobenzoic acid (PABA) into the air sac led to the production of a strain with high resistance to the inhibitory effect of PABA, this effect being measurable in terms of mean survival time of infected embryos in eggs inoculated with varying amounts of PABA. An increase in resistance was first noted on the 4th and was definite by the 8th passage; no further change occurred until the 24th passage, when high resistance (estimated at about 20-fold) became evident and was well established by the 37th passage. Limit-dilution strains derived from the parent and PABA-resistant (37th passage) strains showed no morphological differences and elicited similar complement-fixing antibody responses in guineapigs. PABA resistance was unaffected by passing the resistant strain rapidly 10 times in eggs without the drug. Studies of the growth of the parent and PABA-resistant strains in eggs with and without PABA showed that the resistant strain was to some degree affected by PABA; thus, the action of 0.2 mgm. PABA on the parent strain appeared to be slightly greater than that of 3 mgm. but less than that of 10 mgm. on the resistant strain. It is considered that, while the first increase in PABA resistance may have been the expression of a phenotypic characteristic, the second step was probably a true mutation. *R. S. F. Hennessey*

- BOVARNICK, Marianna R. & ALLEN, Emma G. **Reversible Inactivation of Typhus *Rickettsiae* at 0°C.** *J. Bacteriology*. 1957, Jan., v. 73, No. 1, 56–62. [14 refs.]

Purified preparations of rickettsiae (epidemic typhus strain E) which had been diluted in isotonic salt solutions of various compositions showed marked loss of haemolytic activity and mouse toxicity when left overnight at 0°C., this loss being greatest in preparations suspended in sucrose solution during harvesting and purification. Stability was increased by adding diphosphopyridine nucleotide (DPN) or Mg and Mn to the diluting medium, or by raising the pH of the medium from 7.0 to 7.3; addition of glutamate produced marked decrease in stability when sodium concentration was high, but addition of glutamate in the absence of sodium or sodium in the absence of glutamate had little effect.

The loss in toxicity and haemolytic activity occurring after 18 hours at 0°C. was largely reversible by subsequent incubation of rickettsiae at 33°C. for 3 hours in a medium containing DPN, coenzyme A, Mg, Mn, glutamate and albumin, 60–100% of the initial activity being regularly restored. The changes in toxicity and haemolytic activity were paralleled by changes in infectivity for eggs and in oxidative activity.

It is suggested that the loss of biological activity may be due to the combined effect of loss of DPN and changes in the concentrations of inorganic ions in rickettsiae maintained at 0°C. *R. S. F. Hennessey*

- I. SIKORA, Hilda. Meine Erfahrungen bei der Läusezucht. [**Experiments in Rearing Lice**] *Ztschr. f. Hyg. u. Infektionskr.* 1944, v. 125, No. 5, 541–52, 3 figs.
- II. ALPATOV, V. V. & NASTUKOVA, O. K. [**Transformation of the "Head" Form of *Pediculus humanus* into the "Body" Form, under Changed Conditions of Existence**] Reprinted from *Bull. Moscow Nat. Hist. Res. Soc.* 1955, v. 60, No. 4, 79–92, 5 figs. [17 refs.] [In Russian.]
- III. SCHÖLL, S. Kopf- und Kleiderlaus als taxonomisches Problem. [**The Taxonomic Problem of Head Lice and Body Lice**] *Parasitologische Schriftenreihe.* 1955, No. 1, 58 pp., 30 figs. [46 refs.] Jena: Gustav Fischer.

I. In the first part of this paper the author describes methods of rearing lice for experimental purposes. She is of the opinion that nearly all louse strains are hybrids between a large body louse type (with a slender fore leg in the male and two rows of abdominal muscles in the female) and a small head louse type (with compact fore leg in the male and one row of abdominal muscles in the female). In the course of many years' experience she has only found 7 pure strains of head lice and no completely pure body louse strain. One of the head louse strains was reared in captivity (fed on the arm) for 11 generations without increase in size.

In order to rear head louse colonies in captivity, it is necessary for them to feed on bare skin at least 4 times in 24 hours. Body louse colonies, on the other hand, can be maintained with ease in boxes closed with gauze, through which they can feed satisfactorily. Details are given of suitable cages for rearing lice against the human body, with notes on the gauze mesh suitable.

In the later part of the paper the author points out that lice can become infected with certain cocci, especially under humid conditions (as may be caused by human sweating, in the summer). Danger of infection of the lice may be reduced by proper ventilation and by reducing the numbers of males in the colonies.

II. Collections of head lice and body lice were made from naturally infested persons at a cleansing station. A series of 9 different measurements were made on adult male lice of both types. These measurements were made on the more chitinized regions, to avoid distortion. The locations of the measurements (4 on head and antennae, 5 on first tarsi) are shown by figures. The averages of these measurements are all clearly distinct, though in some cases there are slight overlaps of extreme forms.

Rearing experiments were conducted on both forms of lice. One series was kept in an incubator at 30°C. and 70% RH and fed twice daily; a second group were kept in an incubator at 25°C. A third series was reared in pill boxes, worn continuously against the skin under the underwear. At first the head louse strains showed much greater mortality than the body lice, but after 5 generations there was no difference.

Measurements were made on adult males of various generations up to the 6th. In addition some measurements were made of the dimensions of opercula for the eggs [(height/width) \times 100 = "opercular index"]. In all respects the general result was the same; within 5 or 6 generations the dimensions of the head louse strain had become the same as those of body lice.

The authors point out the significance of this change in relation to typhus. Epidemics of this disease in the past have always been associated with widespread body-lice infestation. If head lice can transform themselves into body lice in 5 or 6 generations, they too must be considered as a possible menace.

III. The author begins with a critical survey of the literature on the status of the two forms of human lice, with details of the differentiating morphological characters discussed by earlier workers. His own investigations consist of a series of measurements of different characters of adult head and body lice. These measurements were made on the more chitinized portions of legs and on setae and these were chosen as being least liable to deformation during the preservation of the specimens. The exact locations of the measurements are shown by figures. The body lice used belonged to a laboratory colony, originally obtained from the Tropical Institute in Hamburg. The head lice used were from a series of natural infestations taken from people attending the disinfection station at Leipzig. One of these collections was kept in culture for 6 generations. Culturing head lice is notably difficult; they have to be maintained almost continuously on the body, and even then there may be high mortality. Body lice thrive if they are fed only twice daily and kept in an incubator at other times.

The results of the measurements on 80 male body lice and 90 head lice and on 100 female body lice and 110 head lice are given in tables and illustrated by diagrams. Nearly all the measurements of the body lice averaged from 12% to 38% greater than the corresponding measurements of the head lice. In nearly all cases, the maximum values for head-lice were below the minimum figures for body-lice. The data for

the cultured head-lice strain in the 3rd and 6th generation are also given. These are slightly larger than the average of the "wild" lice, but do not approach the dimensions of the body lice.

[These three post-war papers on the two forms of *Pediculus humanus* do not seem to have been noticed in Britain. The observations of Sikora, though not supported by many data, seem to explain the contradictory findings of the other two papers and they are consistent with the experiments of the abstracter (*Bull. Hyg.*, 1948, v. 23, 982). If most louse strains are hybrids, the head-lice type would tend to die out in colonies reared in gauze-covered boxes, to which they are not adapted. Thus, the *capitis* type would appear to "change into" a *corporis* type, as suggested by KEILIN and NUTTALL (*Parasitology*, 1919, v. 11, 279) and ALPATOV. On the other hand, with very careful attention, the characteristics of the head louse may be preserved in "captivity" for 6, 11 or even 43 generations, as shown, respectively, by Schödl, Sikora and Busvine.]

J. R. Busvine

WRIGHT, J. W. & BROWN, A. W. A. **Survey of Possible Insecticide Resistance in Body Lice.** *Bull. World Health Organization*. Geneva. 1957, v. 16, No. 1, 9-31. [10 refs.]

This paper reports, with much tabulated matter, the results of a world survey by the World Health Organization on the susceptibility of body lice to insecticides. 37 countries are covered by the survey and the work continues, standard kit being issued by WHO for testing the mortality of lice in 24 hours of contact with DDT, gamma BHC or synergized pyrethrins dusted on a standard type of cloth. Some detail is given of the test. A 90% mortality is accepted, from tests with known susceptible strains, as the kill for a strain normally susceptible to DDT (at 5.5 mgm. DDT per sq. cm. which is the deposit in the standard test). A mortality figure of 83% or less is significantly lower and indicates resistance.

There is a little evidence of the level of resistance in the louse population differing with individual hosts. In Europe, including the northern Mediterranean countries, there is little indication of general abnormality in the susceptibility of lice to DDT despite histories of dusting for several years. Samples from the Indian continent were also normally susceptible but Iran and other Middle East countries generally showed a low level of susceptibility to DDT, where DDT-dusting has been practised. In the African continent, in America and in Japan and Hong Kong, there is a general trend revealing, as in the Middle East, resistance to DDT where dusting is practised regularly but usually more normal susceptibility if dusting has never, or only occasionally, been carried out.

Susceptibility to gamma BHC was generally normal but there were exceptions, including BHC-resistance in DDT-resistant lice from Japan.

It seems that this BHC-resistance has developed with the substitution of BHC in 1952 when DDT-resistance was detected.

Resistance to pyrethrins is not generally apparent, although this insecticide has a reduced effectiveness in Japan and one or two other places.

DDT-resistance and BHC-resistance show slight correlation, but this is absent with pyrethrins.

D. S. Bertram

SHEVELEV, A. S. **The Effect of Splenectomy and Blockade on Reactiveness of the Organism of White Mice with Experimentally Induced Typhus.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, No. 1, 106-9. [11 refs.] [Translated from Russian.]

"Blockade with trypan blue and splenectomy produced different effect on rickettsial intoxication and pneumonia in white mice. Blockade with trypan blue caused an increased mortality in white mice with rickettsial intoxication and rickettsial pneumonia, whereas splenectomy in the majority of experiments increased the resistance of mice to *R. prowazeki*."

GREIFF, D., POWERS, E. L. & PINKERTON, H. **Further Studies on the Effects of X-Radiation on the Multiplication of *Rickettsia mooseri* in Embryonate Eggs.** *J. Exper. Med.* 1957, Mar. 1, v. 105, No. 3, 217-22. [13 refs.]

Multiplication of *Rickettsia mooseri* in fertile eggs was not affected by X-radiation (a single dose of 500 or 1,000 r) of the organisms before inoculation, but rickettsial growth occurred earlier and reached higher peaks when eggs were given a single dose of 500 r during the period from 7 days before to 6 days after inoculation. Maximal acceleration of rickettsial growth was seen in eggs irradiated 6 days after inoculation, when smears from control eggs showed 10-100 rickettsiae per oil immersion field. Enhancement of rickettsial growth following egg irradiation appears to be due to changes induced in the host cells, these changes persisting for at least 7 days.

[For earlier studies by the authors, see this *Bulletin*, 1953, v. 50, 399.]

R. S. F. Hennessey

GREIFF, D., POWERS, E. L. & PINKERTON, H. **The Effect of X-Rays on the Rickettsiostatic Activity of Streptomycin, Aureomycin and Penicillin.** *J. Exper. Med.* 1957, Mar. 1, v. 105, No. 3, 223-32. [31 refs.]

The inhibitory effect of streptomycin on the growth of *Rickettsia mooseri* in eggs was almost completely abolished when the eggs were

subjected to 1,000 r of X-radiation on the 4th day of incubation, the organisms being inoculated on the 5th day and the streptomycin (5 mgm.) on the 7th day. This treatment did not affect inhibition by penicillin or chlortetracycline given in the same dosage. In the case of streptomycin, radiation doses less than 1,000 r gave a graded response. With 500 r, the rickettsiostatic activity of 2 mgm. streptomycin was completely abolished, that of 16 mgm. being partly abolished. Reversal of the inhibitory effect of streptomycin was detectable when eggs were irradiated 3 days before or up to 6 days after injection of the antibiotic. It is suggested that the streptomycin inactivation may be due to combination of the drug with degradation products resulting from irradiation, or to the presence of abnormally large amounts of substances which compete with streptomycin.

R. S. F. Hennessey

REED, C. F. & WENTWORTH, Bertina B. **Q Fever Studies in Ohio.** *J. Amer. Vet. Med. Ass.* 1957, May 15, v. 130, No. 10, 458-61, 1 fig.

"1) Infection with *Coxiella burnetii*, the causative agent of Q fever, has been established in Ohio dairy cattle.

"2) Transmission of the infection within a dairy herd has been demonstrated, and the possibilities of herd-to-herd transmission through contact has been suggested.

"3) The distribution of infection has suggested the presence of enzootic foci of bovine infection.

"4) Limited investigations have failed to demonstrate infection in man but a situation of potential endemicity is considered to exist."

VUKSIĆ, L., ARSIĆ, B., MEL, D., MORELJ, M., GERBEC, M., MILOVANOVIĆ, M., STOJKOVIĆ, L., MIRKOVIĆ, M. & MILIVOJEVIĆ, M. *Izolacija Coxiella burnetii iz stajske prašine. [Isolation of R. burnetii from Sheep-Fold Dust] Higijena.* Belgrade. 1956, v. 8, No. 4, 240-45. English summary.

URBACH, H. Über die Isolierung eines neuen Stammes der *Rickettsia burnetii* und sein biologisches Verhalten. [**The Isolation of a New Strain of Rickettsia burnetii and its Biological Behaviour**] *Ztschr. f.d.g. Hyg. u. ihre Grenzgebiete.* Berlin. 1957, Jan., v. 3, No. 1, 35-42, 1 fig.

In 1954 a sample of blood was received from Plovdiv, Bulgaria, taken from a patient suffering from Q fever during a local epidemic of the disease. It had been kept for 5 weeks at ambient temperature and was

heavily contaminated with spore-forming organisms, but it was nevertheless possible to isolate a strain of *R. burneti* from it by inoculation of guineapigs and subsequent passage. A yolk sac antigen of the 2nd egg passage gave higher heterologous titres in cross-fixation tests with the Grita strain isolated in Greece in 1944, but slightly higher homologous titres were obtained after 21-23 passages in eggs. *D. J. Bauer*

QUINTIN, DESNUES & AUDRAN. Note sur vingt-cinq cas de fièvre Q observés à bord de certains navires de la Marine nationale à Saigon. [A Note on 25 Cases of Q Fever observed on Board certain Ships of the French Navy at Saigon] *Rev. Méd. Nav. (Métropole et Outre-Mer)*. Paris. 1957, v. 12, No. 1, 7-27, 20 figs. & 4 graphs. [14 refs.]

The authors report from Saigon on Q fever seen in 25 members of the French Navy during June to July 1954. They note the frequency of lassitude and frontal headaches and discomfort in the chest accompanied by coughing, chiefly unproductive. Radiological evidence of pulmonary involvement was common but bore little relation to the presence or absence of abnormal signs on clinical examination of the chest. In none was there splenomegaly or signs of meningitis and an erythematous rash in only one case. Except for one patient who developed chorio-retinitis convalescence was uneventful. The diagnosis was confirmed by agglutination tests which were positive in most cases, however, in only low dilution.

One ship bringing 12 of the patients had only just arrived from France and it was concluded that the disease was spread by droplet infection on the boat from the first patient observed 23 days after leaving France.

Clinical notes are given of all 25 patients. *Frederick J. Wright*

BARTONELLOSIS

ZEGARRA ARAUJO, N. **Bartonellosis and Tetracycline.** *Antibiotic Med.* New York. 1955, Apr., v. 1, No. 4, 201-9. [11 refs.]

The author recognizes four stages of bartonellosis: (1) the febrile and haemolytic stage: Oroya fever; (2) the "in-between" pre-eruptive stage when there may be vague ill-health, irregular fever and a tendency to secondary infections; (3) the eruptive stage: verruga peruana; (4) a healthy carrier state. *Bartonella bacilliformis* are found in large numbers only in the first febrile stage.

Tetracycline was used in the treatment of 5 patients, 4 of whom were in the febrile stage and one in the eruptive stage. In the 4 patients

in the febrile stage the onset had been 11, 10, 16 and 4 days before admission, with fever and general malaise, pains in the bones, joints and muscles, especially the calves, profuse sweating, rigors, nausea and vomiting, and diarrhoea. There was anaemia—in some cases severe and accompanied by tachycardia and dyspnoea—oedema, splenic and hepatic enlargement, generalized lymphadenitis, and dark-coloured urine.

In the first 2 patients the haemoglobin was 3·4 gm. and 4·5 gm. per 100 ml. blood, and 95% and 90% of the red cells were parasitized. In the other 2 patients the percentage of infected red cells was 10% and 25% and the haemoglobin 11·8 and 11·0 gm. per 100 ml. No parasites were observed in the fifth patient's blood and there was no anaemia.

Tetracycline was given in doses of 250 mgm. every 4 or 6 hours, a total of 1 gm. daily, for about 4 days, with reduced dosage subsequently up to totals of 5·5 to 6·0 gm. The patient with verruga peruana was given a total of 13 gm.

In all cases the acute symptoms subsided within 24 to 48 hours and all other symptoms within a few days except in the first case in which they subsided within 14 days. In the patient with verruga, the lesions showed a definite reduction within 48 hours and by the tenth day there remained only pigmentary changes. Parasites had disappeared from the blood by the eighteenth, tenth, fourth and eighth days, respectively, in the 4 cases.

The haemoglobin percentage increased in every case, but in the first 2 blood transfusions were given.

L. E. Napier

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

PANTHIER, R. L'homogénéité, qualité essentielle de toute suspension virulente. [**Homogeneity, Essential Property of Virulent Suspensions**] *Ann. Inst. Pasteur.* 1957, Mar., v. 92, No. 3, 310-21. [10 refs.]

Measures to secure maximal uniformity in physical dispersion and virulence of virus suspensions are examined in the light of observations on the 17D and Dakar strains of yellow fever virus. Satisfactory dispersion (and improved yields) of 17D virus particles was obtained by freezing homogenates of infected chick embryos at $-60^{\circ}\text{C}.$, thawing quickly, and centrifuging. A single-stage lyophilization process gave a product containing less than 0·2% residual moisture. Development of a pink colour (from dissolved haemoglobin) after several months'

storage at -25°C . indicated an excessive moisture content; a brown colour appeared if the temperature of storage was allowed to rise above the minimum required for preservation of virus activity.

The extent to which virus particles in a given preparation vary in virulence (*dispersion de la virulence*) can be assessed from a study of virulence curves [this *Bulletin*, 1957, v. 54, 561] and the relationship of the LD₅₀ to the minimum infective dose (obtained from the percentage of surviving immune mice) before and after lyophilization. Heterogeneity can be reduced by attention to details of preparation, including quality and size of inocula, and duration and temperature of growth in eggs. Homogeneity of virus preparations is essential for immunizing purposes and for evaluation of experimental results with reasonable precision.

R. S. F. Hennessey

BECKER, H. & LIESKE, H. Allergische Reaktion nach Gelbfieberimpfung. [**Allergic Reaction after Yellow Fever Inoculation**] *Ztschr. f. Tropen-med. u. Parasit.* Stuttgart. 1957, v. 8, Nos. 1/2, 4-7. [16 refs.]

This paper records the appearance of a severe reaction to 17D vaccine in a man of 44. It appeared 6 hours after inoculation in the form of fever, rigors, and later myalgia and collapse. Subsequently, there was a polyarthritis, which included a serous effusion in the knee-joint lasting for more than 6 weeks. This appears to have been an allergic reaction to the chick embryo protein in a person already sensitized. The patient had had a number of inoculations in the past, including yellow fever vaccination.

H. J. O'D. Burke-Gaffney

RABIES

MALÁGA-ALBA, A. **Rabies in Wildlife in Middle America.** *J. Amer. Vet. Med. Ass.* 1957, May 1, v. 130, No. 9, 386-90, 2 maps. [18 refs.]

"The continental wildlife in Middle America constitutes a reservoir for the perpetuation of rabies. It has been responsible for periodic epizootics in almost all of the countries and, also, for the transmission of rabies across international borders.

"The presence of mongoose rabies in five major islands of the Caribbean Sea presents a serious obstacle to eradication and a threat to those islands with a large mongoose population which, at present, are rabies free.

"The migratory nature of the flights (some of 800 miles) of *Tadarida brasiliensis mexicana* has a seasonal regularity associated with reproduction rather than a lack of food.

"Observations over a period of four years indicate that rabies is enzootic in *Tadarida* and is not the result of casual contact with hematophagous bats."

ACHA JAMET, P. & ZAPATEL VASQUEZ, J. Estudio en quirópteros de la región de San Martín (Perú) como probables reservorios de rabia. [**Study of Bats as Probable Reservoirs of Rabies in the San Martín Region of Peru**] *Bol. Oficina Sanitaria Panamericana*. 1957, Mar., v. 42, No. 3, 211-22, 8 figs. [43 refs.]

The authors discuss the literature on bat rabies, with which readers of this *Bulletin* will be familiar. They then record that at the end of 1954, during an outbreak of canine rabies in the San Martín region of Peru, there were reports of cattle having been bitten by bats. The authors found cattle in some parts of this region with wounds suggesting such bites. They then made an investigation to discover whether there were any vampire bats in that region, whether they harboured rabies virus and whether illnesses, including paralysis, reported in the cattle were in fact due to rabies.

They captured and examined 104 bats in 6 localities and describe and illustrate fully the 7 species identified. None of these were haematophagous and none were found to harbour rabies virus.

The authors point out that these negative findings do not exclude the possibility that rabies exists in bats in other parts of the region, especially as these studies were limited and as some bats themselves tend to die off during an outbreak of rabies in cattle. Further studies are necessary to ascertain if rabies in vampire bats can be found which would account for the epizootic in cattle.

H. J. O'D. Burke-Gaffney

BRICEÑO ROSSI, A. L. La rabia y su control en Venezuela. [**Control of Rabies in Venezuela**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1957, v. 8, Nos. 1/2, 24-7. German summary.

In tropical America there are 2 main varieties of rabies: common rabies and the paralytic bovine type transmitted by vampires. The author has confirmed the work of PUNTONI and other virologists to the effect that there are several types of virus and that vaccination against one does not protect fully against the others.

In tropical America the animal reservoirs of rabies are the dog, the cat, the mongoose, the fox and the vampire. The main reservoir is the dog. In Caracas in 1951-52, 8,627 people were reported to have been bitten by 5,809 animals of which 2,500 dogs were detained for observation.

A clinical and virological study has been made of 580 rabid animals sent to the author's laboratory: they included 546 dogs and 29 cats. Direct examination revealed the presence of Negri bodies. The diagnosis was further confirmed by inoculation into rats, guineapigs, hamsters and rabbits and by complement-fixation and neutralization tests. The finding of Negri bodies depends on the stage of the disease at which the animal is killed or dies. When it is killed immediately after biting someone Negri bodies may be as low as 40% compared with 78-82% in those which are allowed to die. Directions are given for the rapid staining of a piece of the horn of Ammon which enables a diagnosis to be made in a few minutes.

Between 1950 and 1954, 7,799 suspected animals from all over Venezuela were examined: 7,200 were dogs; others included cats, cows, foxes, monkeys, donkeys and horses. It was the dog which was responsible for the transmission of the disease to man.

Dogs should be systematically vaccinated against rabies by a living virus of the Flury type modified by cultivation on chick embryos. For the control of bovine rabies transmitted by vampires a study is needed of the habits and migrations of vampires and in affected areas vaccination of the cattle.

There is understandable apprehension among people undergoing anti-rabies vaccination after being bitten or licked by a rabid animal. Up to December 1955 the author had vaccinated 28,000 persons against rabies. There has been no case of post-vaccinal encephalitis or paralysis, nor has any laboratory worker handling the virus developed encephalitis.

For dangerous bites on the face, neck or bare skin the combined use of hyperimmune serum and vaccination is recommended. A fatal case is mentioned of a boy of 14, in whom the incubation period was only 9 days. At the other extreme was a woman in whom it was 345 days. In this case the bite was also fatal. Vaccination with a virus of the Pasteur type was done soon after she had been bitten on the face. It is suggested that it was paralytic bovine virus against which the Pasteur vaccination is not fully protective.

Recently a trial has been made of a vaccine prepared by Dr. Koprowsky of the Lederle Laboratories from chick embryos. 13 people were vaccinated with 3 doses each of 0.2 cc. intradermally: neutralization tests showed that in 5 there was no increase in immunizing strength.

Allen Daley

KRAUSE, W. W. Kritische experimentelle Studien über die Prüfung von Tollwutimpfstoffen, die Pathogenese der Lyssa und das Geschehen in der Inkubationsperiode. I. Mitteilung. Die Prüfung der Tollwutimpfstoffe. [**Critical Studies of the Testing of Rabies Vaccines, the Pathogenesis of Rabies, and the Course of the Incubation Period. I. Testing of Rabies Vaccines**] *Zent. f. Bakt.* I. Abt. Orig. 1957,

v. 167, Nos. 6/7, 458-80, 4 figs. II. Mitteilung. Die Pathogenase der Tollwut und die praktische Wertung der Wutschutzbehandlung. [II. Pathogenesis of Rabies and the Practical Evaluation of Anti-Rabies Treatment] *Ibid.*, 481-503, 4 figs. [42 refs.]

An evaluation of the Habel and Hempt methods of testing rabies vaccine has been made in comparison with the method of plantar inoculation of mice developed by the author. In 26 Habel tests carried out with 4,200 mice the virus dose-mortality curve showed low percentage mortality at the higher dose levels of virus, and it was therefore not possible to calculate the LD₅₀ by the cumulative method. The Hempt method had a standard deviation of 44.8% and was regarded as too inaccurate to be of value. In the plantar test mice are immunized with an intraperitoneal injection of the test vaccine on the 1st and 4th days, and the challenge is carried out on the 15th day by injection into the sole of the left hind foot; the dilutions of challenge virus are made in steps of 0.5 log unit, with an expected titre of 3 log units. 5 groups of 10 mice are used in both test and control series, and the results evaluated as in the Habel test. The results of plantar tests carried out on various types of vaccine are given as an illustration of the method.

The pathogenesis of rabies infection in mice after plantar injection was studied with the object of investigating the theoretical validity of the method. Virus could be found in the brains of mice $\frac{1}{2}$ -5 hours after plantar injection of fixed virus; after this time virus was found only irregularly until the onset of multiplication after 72 hours. In similar experiments in immunized mice the virus could not be found in the brain at any time and there was therefore no evidence that the virus migrated along the nerves after plantar injection. 50 mice were infected with street virus by plantar injection and were then given 4 doses of immune serum at intervals up to 72 hours; 4% developed rabies, compared with 68% of a control group not given immune serum. Passive immunization was least effective in similar experiments in which the incubation period was reduced, but a failure rate of only 3-7% was observed in mice immunized with Semple vaccine after plantar injection of street virus. The latter observation affords an experimental verification of the validity of Pasteur's method of post-infection immunization. D. J. Bauer

STARKE, G. Untersuchungen über den Einfluss des Elektroschocks und des medikamentösen Schlafes auf das Infektionsgeschehen der experimentellen Tollwut bei Laboratoriumstieren. [Investigations on the Effect of Electric Shock and Therapeutic Sleep on the Course of Infection in Experimental Rabies in Animals] *Ztschr. f.d.g. Hyg. u. ihre Grenzgebiete*. Berlin. 1957, Jan., v. 3, No. 1, 71-7, 7 figs.

6 rabbits were inoculated intracerebrally with fixed rabies virus and were subjected at daily intervals to an electric shock of 200 mA strength

and 0.5 second duration, which produced convulsions and unconsciousness lasting for 2 minutes. The treatment had no effect upon the incubation period and mortality in comparison with an untreated group of infected animals. No effect was observed in a similar experiment in which a dose of virus around 1 LD₅₀ was used. In experiments with mice infected by subcutaneous inoculation the course of infection and mortality were not influenced by electroconvulsive therapy; in mice kept under continuous narcosis with luminal some reduction in incubation period and increase in mortality were observed.

D. J. Bauer

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

HIGUCHI, K. & CARLIN, C. E. **Studies on the Nutrition and Physiology of *Pasteurella pestis*. I. A Casein Hydrolyzate Medium for the Growth of *Pasteurella pestis*.** *J. Bacteriology*. 1957, Jan., v. 73, No. 1, 122-9, 5 figs. [21 refs.]

This paper gives the results of an investigation of factors influencing the growth of *Pasteurella pestis* in a medium principally composed of a partial hydrolysate of casein (prepared by autoclaving casein with dilute H₂SO₄ for 2 hours followed by treatment with an anion-exchange resin to remove the H₂SO₄). It was found that glucose stimulated growth at concentrations of 1 to 3 mgm. per ml., but addition of 4 mgm. per ml. or more sharply reduced cell yield. D-xylose and D-mannitol were superior to glucose; the formula ultimately adopted for the medium contained 1% D-xylose, more xylose being added in increments of 10 mgm. per ml. during growth until a total of 20-40 mgm. per ml. had been consumed.

It was noted that initiation of growth from small inocula (1-10 cells per ml.) required a reduced concentration of casein hydrolysate (about one-tenth of that giving highest cell yields from inocula of $1-5 \times 10^5$ cells per ml.). When cultures were incubated at 27°C. with aeration, yields as high as 1×10^{11} viable cells per ml. were obtained from a medium containing casein hydrolysate corresponding to 2.5% casein, K₂HPO₄ at 0.025 M, citric acid at 0.01 M, Na-gluconate at 0.01 M, MgSO₄ at 0.0025 M, FeSO₄ at 0.0001 M, MnSO₄ at 0.00001 M, Na₂S₂O₃ at 0.0025 M and D-xylose at 1%. For maximal growth of *P. pestis* at 37°C., it was found desirable to modify this medium by adding glycine at 0.027 M, Ca panthothenate at 1.0 µgm. per ml., thiamine at 1.0 µgm.

per ml. and biotin at 1.0 μ gm. per ml., increasing the MgSO_4 concentration to 0.02 M and substituting cysteine at 0.004 M for the $\text{Na}_2\text{S}_2\text{O}_3$.

R. S. F. Hennessey

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

BANERJEE, S. & GHOSH, H. **Glomerular Filtration Rate and Renal Plasma Flow in Cholera and Acute Gastroenteritis.** *Proc. Soc. Exper. Biol. & Med.* 1957, Apr., v. 94, No. 4, 668–70.

“Glomerular filtration rate and renal plasma flow were determined by inulin and para-amino hippuric acid clearance tests in 19 normal subjects, in 14 cholera patients and in 6 patients suffering from acute gastroenteritis. In patients suffering from cholera and acute gastroenteritis, glomerular filtration rate and renal plasma flow were greatly diminished to the same degree, when these patients had apparently normal urination after transfusion of saline. The diminished clearance values might be due to renal anoxia causing temporary diminution in blood flow through the cortex of the kidney and not due to any specific toxins of the disease.”

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

LORAN, Muriel R., KERNER, M. W. & ANDERSON, H. H. **Dependence of *Entamoeba histolytica* upon associated *Streptobacillus* for Metabolism of Glucose.** Reprinted from *Exper. Cell Res.* 1956, Feb., v. 10, No. 1, 241–5, 1 fig.

“*E. histolytica* (F-22, streptobacillus associate) contains relatively large amounts of glucosamine. The amoeba cannot synthesize glucosamine, but is dependent upon the bacterial associate for its supply of this aminosugar. This amoeba does not utilize glucose as such, but only

the products of glucose metabolism of the mono-associate. A definite metabolic link is believed to occur between this amoeba and its associated organism."

WELLS, R. **The Amoebic Complement Fixation Test.** *Med. J. Malaya.* 1956, Dec., v. 11, No. 2, 93-111, 5 figs. [25 refs.]

The identification of parasites in the stools is proof of an intestinal infection with *Entamoeba histolytica*. A harmless commensal infection with this parasite in conjunction with non-amoebic disease of the bowel—such as ulcerative colitis—may result in the passage of the vegetative stage of the parasite with engorged red cells. This may lead to an erroneous conclusion as to the true cause of the bowel condition. A simple and reliable collateral test which will indicate active pathogenicity of the parasite to its host therefore becomes very desirable. The complement-fixation test [CFT] is the test most developed and most likely to be usefully applicable for this purpose. After a brief review of the literature on the CFT in amoebiasis, the author describes his methods of preparation of antigens for the test from cultured amoebae, and his technique for the performance of the test. The antigen finally selected was a dried alcohol-extracted preparation; it was stable and proved effective. Very full details of the methods proving most satisfactory are set out in the appendices to this paper and should be consulted in the original by those interested in the subject.

The CFT was done on sera obtained in London from patients with hepatic amoebiasis, with amoebic dysentery, with suspected amoebiasis, with possible amoebiasis, and with asymptomatic infections ("carriers"), and also on control sera. No statistical analysis is justified on the small series of cases examined, but some false positive and false negative findings at least indicated that the test was by no means infallible. Nevertheless, the purpose of the work was to produce an antigen and to standardize the technique for its use for a CFT which would be both cheap and easy to perform. These ends the author considers he has achieved.

A. R. D. Adams

RICHOVSKY, A. [**Amoebiasis and Diseases of the Anus**] *Dapim Refuim.* Tel-Aviv. 1956, Dec., v. 15, Nos. 5/6, [in Hebrew 433-4. English summary vii].

The English summary appended to the paper is as follows:—

- "1. Itching in the anal region may be caused by an amoebic infection.
- "2. Infection of the anal sphincter is caused sometimes by amoebae.
- "3. Hemorrhoids in a latent state may exacerbate acutely and become infected because of an amoebic process.
- "4. In all disturbances in the anal region a strict search for amoebae is recommended."

- PANE, A., PEZZULLO, C. & SCHIMIZZI, M. Amebiasi con necrosi estesa del colon e peritonite generalizzata. [**Amoebiasis with Diffuse Necrosis of the Colon and General Peritonitis**] *Acta Med. Italica*. 1957, Mar., v. 12, No. 3, 75-80, 9 figs. [12 refs.]
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RELAPSING FEVER AND OTHER SPIROCHAETOSSES

- MALDONADO SAMPEDRO, M. & DE VERA ANDREY, R. Estudio sobre el empleo de la terramicina en el tratamiento de la fiebre recurrente española. [**Studies on the Use of Oxytetracycline in the Treatment of the Spanish Type of Relapsing Fever**] *Rev. Sanidad e Hig. Pública*. Madrid. 1956, Sept.-Oct., v. 30, Nos. 9/10, 598-647. [45 refs.]

The authors refer to the variable results obtained in the pre-antibiotic era in the treatment of relapsing fever of the *Spirochaeta hispanica* type. They quote from the literature, including their own results with 156 cases, in which there were 73% relapses, varying between 42.9% and 100% with the use of 9 different medicaments.

They discuss some of the difficulties and causes of error in results published in the literature. Unless cases are followed up for 3 to 4 months, most of the relapses will be missed. Errors of diagnosis occur in the failure to distinguish between the hispano-African tick-borne disease and the cosmopolitan louse-borne type: the former is more resistant to arsenicals. Finally, they point to the lack of precision which is often seen in the conception of relapses: a relapse may be clinical or biological and account should be taken of inapparent infections. This aspect is discussed.

The authors then discuss antibiotics, especially aureomycin [this *Bulletin*, 1957, v. 54, 574]. In 1954, they treated 39 patients with this antibiotic and 30 with oxytetracycline. The antibiotics were given in the form of tablets of 250 mgm. each: one tablet was given for adults every 4 hours for the initial dose and thereafter every 6 hours, to a total varying between 2 and 4 gm. and in a few cases up to 6 or 8 gm. (1 case). 12 of the 30 patients receiving oxytetracycline relapsed, and 17 of the 39 receiving aureomycin relapsed. The spirochaetes disappeared more rapidly after oxytetracycline and the reactions were less severe.

The authors attribute the failures not to the drugs as such but to insufficient dosage and to the fact that administration was not adjusted to the "biopathogenic mechanism" of the infection. In the light of their results they consider that the following conditions should be fulfilled: (1) higher doses (6-8 gm.); (2) treatment early enough to prevent the development of more resistant tissue forms; (3) administration of the drug during the stage of parasitaemia; (4) consideration of the defence

mechanism of the host; (5) fractionation of the initial dose to avoid the severe reaction consequent upon the sudden destruction of spirochaetes [*loc. cit.*]. All these points are discussed at great length, with reference to the literature.

With these experiences in mind the authors treated 110 new patients in Trebujena with oxytetracycline in 1955. Three treatment schedules were used, namely: (1) 250 mgm. every 3 hours daily to a total of 6 to 8 gm.; (2) 250 mgm. every 6 hours daily, for 6-8 days; (3) 250 mgm. every 3-6 hours daily for one or two days each week, to a total of 2 gm. weekly for 3-4 weeks. In every case, the first dose was divided into 2 fractions of 125 mgm. each.

Full clinical details are given of all the patients and the results are analysed in terms of clinical and laboratory findings.

The fever disappeared in 6-12 hours in most cases (range 3 to 22) and the parasites in 2 to 4½ hours (range 1½-8). In the 39 patients treated with aureomycin in 1954, the parasites had disappeared mostly in 4-12 hours (range 2½ to 14).

7 patients of the 110 relapsed, 3 each in the first and second schedules and one in the third; none of these had completed the full treatment.

No serious side-effects were seen. In 3 patients initial neurological complications cleared up after treatment in 5-6 days.

The authors conclude that oxytetracycline proved very valuable in the treatment of the Spanish type of relapsing fever; that the most suitable total dose is 6 gm. and that 8 gm. should be used only when there are neurological complications; and that intermittent weekly therapy is better adapted to the immune-biological mechanism.

H. J. O'D. Burke-Gaffney

YAWS AND OTHER TREPONEMATOSES

J. TROP. MED. & HYG. 1957, Feb. & Mar., v. 60, Nos. 2 & 3, 27-38; 62-73, 1 fig. [111 refs.] **Report of Second International Conference on Control of Yaws: Nigeria, 1955** [McLETCHE, J. L., President].

When any extensive activity is to be undertaken information must be collected and plans drawn up for the start of the work. Then, as experience accumulates, modifications will be made until policies and techniques become available which are of wide application with or without adaptation to meet local conditions.

As regards yaws campaigns, the earlier parts of this sequence were dealt with in the sessions of the WHO Expert Committee on Venereal Infections and Treponematoses and at the First International Symposium

on Yaws Control in Bangkok in 1952. At the Second International Conference on Yaws Control, organized by the World Health Organization (WHO) and the Government of Eastern Nigeria, held in Enugu in 1955, the latest developments in policies and techniques were thoroughly dealt with by 53 participants from 30 countries. This report is a full summary of the papers and discussions at the Conference and of the more important and recent writings bearing on the subject.

The report starts with a section on the ecology of the endemic treponematoses and a summary of the work of TURNER and his team at the International Treponematoses Laboratory Center at the Johns Hopkins Medical School, Baltimore. These studies indicate the differences in the results of inoculations in small laboratory animals with treponemes from patients with venereal syphilis on the one hand and with treponemes from yaws on the other. Treponemes from endemic syphilis were found to occupy an intermediate position.

Planning of a yaws campaign is then dealt with and the need to have as full a knowledge as possible of the people and their country and its climate is stressed. If this is not obtained before operations are started many difficulties can arise. In the original plans adequate provision should be made for the development of rural health facilities from which the later stages of the campaign can extend so that the goodwill and cooperation of the community resulting from the success of the yaws campaign can be led into other public health spheres. The need for adequate finance, supplies, equipment, personnel and the recruiting and training of staff are dealt with.

The main effort of a mass campaign should be directed against the most important disease. Activities against other diseases or sanitary deficiencies may be undertaken at the Initial Treatment Survey or Resurveys, by the addition of staff to the team if required. However, the main purpose of the campaign must not be retarded or obstructed. At all stages the cooperation of the people must be earned by all members of the campaign staff. It is important to ensure that the population, from chiefs to villagers, as far as possible, understand what help the campaign can bring to them and what part they must actively play in it.

Since most of the staff will be simply but adequately trained auxiliaries all their campaign activities must be as simple as is in keeping with the purpose of each activity. The classification of the various groups of the population, treatment schedules and all returns should be simple, definite and capable of easy supervision.

In the campaign itself as many as possible of the population concerned should be examined with an ideal of over 95% which in some campaigns can be achieved. The use of a single intramuscular injection of a long-acting penicillin preparation such as procaine penicillin G in oil with 2% aluminium monostearate (PAM) has been an important step in making possible effective yaws campaigns. The recommended adult

dose for patients with active yaws is 1.2 megaunits (4 ml.) and the dose for patients under 15 years of age is 0.6 megaunits. Since the efficacy of this relatively small dose more than ever depends upon the height and duration of the resultant blood level, it is important that the PAM should conform to certain recommended standards. Careful observations in Haiti tend to show that 0.6 megaunits of PAM may be an adequate dose but most participants felt that where adequate PAM was available the larger dose of 1.2 megaunits should be recommended to governments.

Another important factor in the efficacy of modern mass treatment campaigns against yaws is the recognition of the importance of latency and the frequency of relapses of active disease therefrom. The significance of the prevalence of clinically active yaws in determining what treatment policy should be employed depends to some extent upon the amount of treatment that the community has already received. In communities where little or no treatment has been received the ratio of the prevalence of clinically active yaws to that of seroreactors may be under 1:2, but where even unsystematic treatment has been given this ratio might change to 1:4 or more. Where the clinical prevalence is over 10% it is recommended that Total Mass Treatment (TMT) be carried out, that is, all adult patients with active yaws are given 1.2 megaunits (patients under 15 half doses) and the remainder of the population are regarded as latent cases and contacts and are given half the patient doses. Juvenile Mass Treatment (JMT) in which, in addition to the treatment of the patients, all children under 15 years with no active yaws are given 0.3 megaunits, is carried out where the clinical prevalence is 5-10%.

When the clinical prevalence is under 5% Selective Mass Treatment (SMT) is carried out, in which, in addition to the treatment of patients with clinically active yaws, the close contacts of infectious patients are given half doses. It is almost impossible completely to define who are the contacts of infectious yaws cases and unless the prevalence is high the treatment of obvious contacts does not give any better results than the treatment only of patients with active yaws, because of the frequent latent cases that would also be present, some of which would relapse later.

There is no evidence of resistance of treponemes to PAM nor have the side-reactions of PAM been important in any yaws campaign assisted by WHO and UNICEF.

Serological screening during mass treatment is at present not a practical measure for indicating the treatment of individual patients. However, serological surveying is of considerable importance in indicating the true prevalence of the infection and should be carried out at the Initial Treatment Surveys and at Resurveys. This should be done in random areas or on random samples to serve as indications of larger populations.

The expansion of campaigns should be in a regular manner so that

compact areas of country are covered. Activities should be coordinated with adjoining countries where international borders are involved. Because these borders do not necessarily coincide with tribal boundaries and because many people, especially Africans, travel widely the only way to avoid re-introduction of infection in an area freed from yaws is to have coordinated campaigns to eradicate yaws in all adjacent countries where it is endemic.

It is known that venereal syphilis occurs in the larger towns of Africa but reliable data of the prevalence and distribution of venereal diseases in some areas are few and more complete information is urgently needed. Following the eradication of yaws by mass treatment the prevalence of reactors to the serological tests for syphilis falls only slowly so that much residual resistance from yaws to infection with syphilis perhaps remains for some years. Hence while yaws (or endemic syphilis) is being eradicated effective action should be taken against venereal syphilis to ensure that it will not spread into the rural areas freed from yaws.

Resurveys at 6-12-month intervals must be undertaken, to continue the elimination of infectious cases from whatever source they arise. Resurveys should be carried out in a manner that does not interfere with the mass campaign. This is done in some areas by yaws scouts. These are auxiliaries trained to recognize active yaws. They screen villages by house-to-house inspection and identify patients with active yaws and the close contacts of infectious patients; these are checked and treated by more highly qualified staff later. This is the basis of the yaws campaign in Indonesia where only patients with active yaws are treated and the surveys are carried out by calling the people together, but in this campaign the work, being based upon the sub-district polyclinic, is integrated into the public health service from the start and Resurveys are carried out at 6-12-month intervals automatically.

Initial Treatment Surveys and Resurveys may be carried out by calling the people together in suitable numbers or by house-to-house inspections. Which is more suitable depends upon "local conditions". Resurveys are continued until yaws is no longer a public health problem. [This is, at the moment, assumed to be when the prevalence of clinically active yaws is less than 2% and of infectious yaws is less than 0.5%. This is the Indonesian recommendation.] Then, if these are adequate, the rural health facilities should continue the surveillance necessary to bring about eradication. If such facilities are not present then periodical Resurveys must be continued until they are. Such Resurveys should be associated with further measures to improve the health of the population.

The results of Total Mass Treatment on yaws prevalence are remarkable and reductions in one year from 15-20% of clinically active yaws to about 2% and from 2-3% infectious yaws to under 0.3% are to be expected if the coverage has been high. [In the Indonesian campaign, where only active cases are treated, similar reductions are found after 2-3 resurveys over a period of about 2 years.]

The results of campaigns in different countries should be comparable so that improvements in one country may be considered for adoption in others. It is important, therefore, that terminology and methods of reporting should be the same. "Active yaws" should comprise only patients with visible active lesions. "History latent" cases and persons with aches and pains should not be included in "active yaws". [Suitable forms for this purpose are attached as annexes to a paper by HACKETT and GUTHE (this *Bulletin*, 1957, v. 54, 689).]

The importance was stressed of early planning for improved public health facilities in the area of yaws campaigns and, if possible, for these and other means such as improved road communication, environmental sanitation and health education of the public to begin to be effective before the mass treatment phase of the campaign has ended.

This report also refers to a scientific nomenclature of yaws lesions which was considered at the Conference. The classification of yaws patients in mass campaigns should be a simple one such as: (1) infectious yaws; (2) non-infectious yaws, (a) hyperkeratosis, (b) late yaws; (3) inactive late cases; and (4) latent cases and contacts. The accuracy of data in all surveys is important as upon them the assessment of the work and all that that implies depends.

It is noted that endemic syphilis, *e.g.*, bejel, appears to be much more widely spread than was thought before the existence of that disease was well-known.

Over 400 million people are living in the tropics and it is said that perhaps half are exposed to infection with yaws or some other endemic treponematoses such as endemic syphilis or pinta. Health administrations, assisted by WHO and UNICEF, had examined 50 million persons and treated 15 million by the end of 1955. These campaigns are carried out by auxiliaries under supervision. The cost per million persons examined in South-East Asia was about £20,000-£30,000 (US \$60,000-80,000).

The Conference recommended that the attention of health administrators be called to the public health, social and economic value of eradicating endemic treponematoses, particularly yaws, and that an African-wide campaign be coordinated as part of a world-wide programme of yaws eradication. It was proposed that a Third International Conference on Yaws Control be held in 1958 or 1959 in the Americas. Finally, it was recommended that investigations be undertaken in relation to the transmission of yaws, penicillin sensitization, the possible development of penicillin resistance in treponemes and serological tests with treponeme antigens.

[This is an important report which will give all those interested in yaws eradication a useful summary of the position at the end of 1955 and will put them in touch with sources of more detailed information.]

A French translation of the same report was published in *Bull. Soc. Path. Exot.*, 1956, v. 49, 1023.

[For a full account of the First International Conference, see this *Bulletin*, 1953, v. 50, 775.]

C. J. Hackett

HASSELMANN, C. M. **Comparative Studies on the Histo-Pathology of Syphilis, Yaws, and Pinta.** *Brit. J. Venereal Dis.* 1957, Mar., v. 33, No. 1, 5-12, 18 figs. [31 refs.]

The author contrasts the different histology of the primary lesions of syphilis, yaws and pinta and points out that the clinical appearances of the lesions distinguishing the diseases are dependent on characteristic histological changes. The epidermis of the hard chancre of primary syphilis shows only moderate acanthosis and spongiosis and in the cutis there are infiltrations with round cells, fibroblasts, histiocytes, plasma cells, some eosinophils and occasional giant cells and there are pronounced inflammatory changes in the intima and media of the capillaries. In the initial papule of yaws there is an exuberant inflammatory response in the epidermis and cutis with enormous acanthosis of the epidermis and in the corium and cutis masses of plasma cells. Miliary intra-epidermal micro-abscesses from diapedesis of neutrophils is typical of yaws. The blood vessels are not affected. In pinta the inflammatory changes are only moderate. Acanthosis is slight and leucocytic diapedesis is minimal without the formation of intra-epidermal abscesses.

The author considers that in yaws the tertiary ulceration seen in gangosa spreads to the mucous membrane from adjacent involved skin and that bone lesions and keratoderma of the soles of the feet are toxic or allergic manifestations as treponemata are not found in the lesions.

Frederick J. Wright

PETRUS, E. & VELARDE THOMÉ, J. Cinco años de campaña contra la frambesia en Haití. [**Five Years of the Campaign against Yaws in Haiti**] *Bol. Oficina Sanitaria Panamericana.* 1957, Jan., v. 42, No. 1, 22-30, 2 figs.

The campaign was a joint effort by the government of Haiti, WHO, the *Oficina Sanitaria Panamericana* (OSP), and UNICEF. It began in July 1950 and its objectives were the eradication of yaws in rural areas and the control of syphilis. The drug used was procaine penicillin in 2% aluminium monostearate; the doses used were 600,000 units for cases of yaws and 300,000 for contacts; in both groups the dose was given in a single injection. The government of Haiti met the cost to the extent of \$605,650; UNICEF \$580,000 and WHO/OSP \$200,055.

An organization chart is given. The campaign began in the Sur department with daily clinics which the inhabitants were invited to attend if they suspected that they were suffering from yaws or had been in contact with it. The clinical incidence was high but facilities for confirming the diagnosis by laboratory methods were inadequate.

Between July 20, 1950 and October 27, 1951, 666,738 (356,241 cases and 310,497 contacts) received a penicillin injection: this was 62.5% of the population. From October 1951 until December 31, 1954 the injection of penicillin was offered on a house-to-house basis. A publicity and record team of 8 people arrived in each district 2 or 3 weeks before the team, also of 8, which would give the injections. Anyone with skin lesions suggestive of yaws was regarded as a case and given 600,000 units; the other occupants of the house were given 300,000 units each. The number of people treated under this scheme was 2,834,712, 97.2% of the population: 923,323 were cases and 1,911,389 contacts.

From January 1, 1955, by which time the incidence of yaws had become low, the house-to-house scheme was replaced by one based on the early discovery of cases. Contacts were now defined as those living within 4 houses on each side of that of a patient and all the scholars in a school attended by a patient. In this last phase the country was divided into 5 zones, 10 sub-zones and 78 sectors: for each sector there was an inspector skilled in the diagnosis of yaws but working under the supervision of a doctor. Up to May 31, 1955, 2,087 cases and 13,007 contacts were given injections.

From time to time samples of the population were subjected to a careful clinical examination. A year after the conclusion of the daily clinic phase, among 12,915 examined in 89 districts 67 cases, 0.5%, were found. The same districts were sampled again and even more thoroughly 2 years later when an incidence of 0.8% was found. In other districts investigated in 1953, 6 to 8 months after the completion of a house-to-house campaign no case was discovered among 5,874 people examined; in yet other areas investigated 16 months after the close of a house-to-house campaign there were 14 cases, 0.3% of the 4,493 people examined; in another 0.7% and in another 0.15%.

Taking the rural parts of Haiti as a whole the incidence of clinical yaws is now less than 1%, probably about 0.5%.

Allen Daley

HUME, J. C. & FACIO, G. Análisis de los resultados del tratamiento de la frambesia mediante una sola inyección de penicilina procaína con un dos por ciento de monoestearato de aluminio. [**Analysis of the Results of treating Yaws with Single Injections of Procaine Penicillin in Two Per Cent Aluminium Monostearate**] *Bol. Oficina Sanitaria Panamericana*. 1957, Jan., v. 42, No. 1, 31-53.

This study took place at a clinic in Bainet, Haiti. It was part of the operation SERPIAN, *Service d'Eradication du Pian et de la Syphilis Rurale*. This area was chosen because it was unlikely that the patients would receive penicillin from any other source. Every patient was examined for clinical signs of yaws in the skin, bones and elsewhere. Serological examinations were made. No case was included in the study

unless *Treponema pertenue* had been seen by dark-ground illumination. The guide for re-treatment was the continued presence of *T. pertenue*.

Between February 12, 1951 and April 26, 1952 there were diagnosed at the clinic 1,535 patients with primary or secondary yaws. For various reasons which are set out in a table 486 were excluded from the study, leaving 1,049.

Patients were not counted in the study unless they attended every week until the lesions disappeared and once a month thereafter until the study was completed in June 1953 when mass medication of the population was started in the area. The treatment used was a single injection of procaine penicillin in 2% aluminium monostearate (PAM). The doses studied were 600,000, 300,000 and 150,000 units. Penicillin is expensive and the smallest effective dose should be used in any mass campaign. Previous work had shown that with a dose of 300,000 units a further injection was needed in 30% to 40%: it is thought generally that smaller doses are effective in yaws than in syphilis.

Of the 1,049 cases included, 51 were primary and were treated with 600,000 units; 826 secondary cases were given 600,000 units; 129 received 300,000 units and 43, 150,000.

The main analytical tables deal with the secondary cases which received 600,000 units of PAM. The follow-up showed that 2.8% needed further treatment within 21-23 months and 4.3% within 27-28 months. Within these same periods the percentages becoming sero-negative were 28 and 34.8 respectively. The results were unaffected by race or by social or economic circumstances. The effect of sex is insignificant. Age, however, is a factor: re-treatment within 21-23 months was needed in 3.4% at ages 0-4, in 4.6% at ages 5-9, 2.9% at 10-14, none at 15-19, 1.7% at 20-29 and 1.3% at 30 years and over. Age, also, is related to the serum response: reversion to serum-negative was found in 39.1% within 24 months at ages 0-4: in 23% at ages 15-19; 26% at 20-29 and 26.9% at 30 years and over.

Until June 1951 a preparation of PAM was used which did not conform to the standards laid down by the Expert Committee on Venereal Diseases and Treponematoses; change to one that did reduced the re-treatment rate from 5.1% to 0.6%.

Of the 51 primary patients 2.4% needed re-treatment within 21-23 months and 72.7% became serum-negative; they all had 600,000 units. There were 129 patients with secondary yaws who had 300,000 units: within 18-20 months follow-up 1.9% needed re-treatment and 25.9% became serum-negative. Of the 43 patients getting only 150,000 units 5.3% needed re-treatment and 39.3% became serum-negative.

The conclusions of the authors are:—

(1) Treatment with a single dose of 600,000 units of PAM is highly satisfactory for primary or secondary yaws.

(2) Doses of 300,000 or 150,000 in a single injection give excellent

results in secondary yaws. Nevertheless having regard to the small number of patients observed they do not, at present, recommend it.

(3) As the objective is the eradication of yaws the best treatment plan is to use 600,000 units for every patient.

(4) The preparation of PAM used must conform to the standard of the Expert Committee.

(5) The serological results are not so good as in the treatment of syphilis. This is probably due to the more lasting effects of the antibodies produced by *T. pertenue*.

(6) The criteria for re-treatment of primary or secondary yaws differ from those applicable to the treatment of syphilis.

(7) Re-treatment in yaws should be given (a) if there is an increase in the serological titre a month or more after treatment or (b) if the original titre persists for 6 months after the treatment. Patients whose titre falls for some months or years or whose titre becomes steady at a considerably lower level after an initial fall need not be re-treated solely on the basis of the serology.

There are numerous tables and a full technical description of PAM.

[See also this *Bulletin*, 1957, v. 54, 689.]

Allen Daley

DE AQUINO, U. M. Bases atuais para o contrôle da framboésia no Brasil.

[**Actual Basis for the Control of Yaws in Brazil**] *Rev. Brasileira Med.* Rio de Janeiro. 1956, July, v. 13, No. 7, 497-507, 5 figs.

[38 refs.] English summary.

The author discusses the nature and extent of yaws in Brazil, and gives a description of the economy, communications and sanitary conditions of each geographical region.

Children are the greatest source of transmission, and lack of resistance to the treponema is demonstrable by the author's intradermal test [this *Bulletin*, 1954, v. 51, 933]. Movement of populations contributes considerably to propagation of the disease, which occurs mostly in the more remote undeveloped regions where living standards are low.

The author criticizes the former "fixed units" and describes a mobile unit which he organized in 1951. He found that a single dose of 1.2 mega-units of aqueous benzathine penicillin G was sufficient to produce clinical and serological cure.

He describes the organization of the campaign, which is divided into administrative, executive and research sections.

He considers that the campaign against yaws in Brazil should be carried out from region to region.

H. J. O'D. Burke-Gaffney

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

VOGELSANG, T. M. *Lepra i Norge. En kort oversikt over et langt kapitel i Norsk medisinalhistorie. [Leprosy in Norway]* *Nordisk Med.* 1957, May 23, v. 57, No. 21, 743–8, 6 figs. [11 refs.]

The English summary appended to the paper is as follows:—

“A short review is given of the occurrence of leprosy in Norway. Special comment is made on D.C. Danielssen & C.W. Boeck’s classic monograph ‘Om Spedalskhed’ (On Leprosy), which was published in 1847 and marked an epoch in the modern scientific study of leprosy. Attention is given also to Armauer Hansen’s discovery of *Mycobacterium leprae* in 1873. This discovery necessarily brought about a change, not only in the conception of the cause of the disease, but also in the manner in which it could be brought under effective control. The Norwegian law of 1877 and the reinforced law of 1885 have served as a model for leprosy legislation in many other countries.

“The table illustrates the rapid decrease in leprosy in Norway. A registration in 1856 showed that practically 3,000 persons had leprosy in a population of about 1,300,000—more than two per mille. In 1957 there are only seven notified cases and none of these have active leprosy.

“In 1854 a medical officer of leprosy was appointed for the whole country. Armauer Hansen held this position from 1875 to 1912. The last to occupy the post, R.S. Melsom, pointed out that such an office was superfluous, and with his discharge on 28th February, 1957, a long and important chapter in Norwegian medical history has been brought to an end.”

ØKLAND, F. *Lepra og lopper i Norge. [Leprosy and Fleas in Norway]* *Nordisk Med.* 1957, May 23, v. 57, No. 21, 751–4. [27 refs.]

The English summary appended to the paper is as follows:—

“This paper considers the geography of leprosy in Norway with reference to previously known factors and, especially, to the ‘flea theory’. This theory maintains that leprosy is transmitted by the human flea (*Pulex irritans*) (*vide* Carrasquilla, Rivas and a paper which the present author will publish in a more special journal).

“Primitive housing conditions, unsanitary environment and neglect of personal hygiene favour the occurrence of leprosy as well as of fleas. The flea pest is due to low hygienic standards and, according to the flea theory, leprosy depends on the human flea. If this is correct, the geography of leprosy cannot be discussed without reference to this temporary parasite.

"In Norway, leprosy always seems to have had its main distribution and highest incidence in the Western districts. This fact may be due partly to the introduction of leprosy from Western Europe into those parts of Norway, and partly to the low hygienic standard long prevailing there."

GONZÁLEZ PRENDES, M. A., MENDIETA HECHAVARRIA, J. M. & VALHUERDI FERNÁNDEZ, C. Reseña estadística de los enfermos ingresados en el Sanatorio Nacional "San Luis de Jagua" desde su fundación hasta en año actual. [**Statistical Review of the Patients admitted to the National Sanatorium "San Luis de Jagua" from its Foundation up to the Present Year**] *Rev. Sifilografia, Leprologia y Dermatologia*. Marianao, Cuba. 1956, Jan.-June, v. 12, No. 1, 5-15.

This report from Cuba describes the patients admitted during the first 11 years since the National Sanatorium was founded in February 1944.

In all, 808 patients were admitted. They are classified according to age, 21 to 30 being the decennium with the highest number; according to race, 55.5% being whites; according to sex, 71.5% being males; according to civil state, 71.5% being bachelors or spinsters; according to nationality, 92% being Cubans; according to the province of Cuba from which they come, Oriente (out of the 6 provinces) accounting for 62.8%. Classified according to occupation, 56% were agriculturists or home labourers, while 11% were without occupation.

80.7% of the patients were lepromatous, 17.1 indeterminate, and 2.2% tuberculoid, the last of these categories comprising 17 patients who were admitted either for reaction or for operation.

During the period 127 patients died. There were 48 births, out of which there were 13 deaths, and the remaining 35 children are still in perfect health.

Ernest Muir

KERBASTARD, P. Réaction d'hémagglutination dans la lèpre. [**The Haemagglutination Reaction in Leprosy**] *Méd. Trop.* Marseilles. 1957, Mar.-Apr., v. 17, No. 2, 251-63. [14 refs.]

With a tuberculin fraction IP48 as antigen and a concentration of 0.5% sheep red cells, inactivated sera in various dilutions were tested for haemagglutination. Sera of 20 non-leprous controls did not show haemagglutination in titres of over 1 in 8. The titre was over 1 in 8 in 19% of 67 tuberculoid cases of leprosy, in 50% of 12 undifferentiated cases, and in 74% of 86 lepromatous cases. It was concluded that the haemagglutination reaction test is valueless in the diagnosis of leprosy and in the classification of types. It was found, however, that especially in lepromatous cases, it was useful in tracing the course and progress of the

disease, as exacerbation was often preceded by a rise in titre, and improvement by a fall in titre, of the reaction. *Ernest Muir*

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (schistosomes, other flukes); CESTODES (Diphyllbothrium, Taenia, Echinococcus, other cestodes); NEMATODES (Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).

BEN-ARI, J. [**Helminthic Infections among the Jewish Population of Jerusalem**] *Harefuah*. Jerusalem. 1957, Apr. 1, v. 52, No. 7, [in Hebrew 168–70, 1 chart. English summary 170–71].

The English summary appended to the paper is as follows:—

“The Helminths were found in 88,984 fecal specimens during the period 1934–1955 in this laboratory. The worms most frequently found were *Ascaris* and *Trichuris*. The others, *Enterobius vermicularis*, *Ankylostoma duodenale*, *Trichostrongylus orientalis*, *Strongyloides stercoralis*, *Taenia saginata*, *Hymenolepis nana*, *Diphyllbothrium latum*, *Schistosoma mansoni*, *Heterophys heterophyes*, *Dicrocoelium dentriticum*, *Heterodera radiculicola*, were rather rare.

“The difference in findings during the mandatory period 1934–1947 and during 1948–1955 after the establishment of the State, are emphasized. During the mandatory period the number of *Ascaris* and *Trichuris* infections was high. Between a half and a third of the Jewish population was infected with at least one of these worms. After the establishment of the State, when contact with the Arab population was broken and vegetables were supplied by Jewish farms only, the number of helminthic infections dropped strikingly. *Ascaris* was found in 1955 in only two of every thousand of the Jewish population. However in 1954 in the Arab part of Jerusalem nearly 80% of the population harboured *Ascaris* and *Trichuris*.”

BUONOMINI, G., RICCIARDI, M. L. & CARLI, G. Osservazioni sui metodi di arricchimento per la ricerca nelle feci di uova di elminti. Proposta di una modificazione del metodo di Ritchie. [**Remarks on Enrichment Methods for the Detection of Helminth Eggs from Faeces. Suggestion of a Modified Ritchie's Method**] *Igiene Moderna*. 1956, Nov.–Dec., v. 49, Nos. 11/12, 971–82.

The English summary appended to the paper is as follows:—

“The authors after a comparative observation of the techniques proposed by Fülleborn-Willis, Faust and Ritchie for the enrichment of

the eggs of Helminths in the faeces suggest a useful modification of Ritchie's method to show either ova of Helminths or cysts of Protozoa."

TOKUMO, S. **On the Histopathological Changes of the Mesenteric Lymph-nodes resulting from Infection of Helminths.** *Hiroshima J. Med. Sci.* 1956, Mar., v. 5, No. 1, 21-43, 16 figs. [22 refs.]

In Japan, infections with intestinal helminths are common in patients admitted to hospital for surgical operations. The author undertook the experiments and observations described in the present paper, because he considered it probable that "the various inconstant digestive symptoms observed in such cases may be caused by the mesenteric lymphadenopathy produced by the intestinal parasitization of those worms". The results obtained from the study of natural and laboratory infections are considered under four headings:—

(i) Dogs were selected which had a natural unmixed infection with one of the following parasites, (a) *Ancylostoma caninum*, (b) *Dipylidium caninum*, (c) *Toxocara canis*, (d) *Metagonimus yokogawai*, (e) *Pygidiopsis summus*, (f) *Diphyllbothrium mansonii* and (g) *Taenia hydatigena*. The selected animals were killed, the mesenteric lymphnodes removed and from these sections were cut and examined.

(ii) Dogs, which showed no evidence of helminthic infection, were exposed to infection with *Ancylostoma caninum* larvae; in some instances large, in other instances, medium or small doses were given. All the dogs which received the large doses died within 15 days; dogs which received medium or small doses survived this period and were killed in some instances after 15 days, in other instances, after 50 days and in other instances, after 6 months. At the subsequent autopsies, the mesenteric lymph nodes were removed, and sections cut and examined.

(iii) Experiments similar to the above were carried out with dogs exposed to the infective larvae of *Toxocara canis*.

(iv) The mesenteric lymph nodes from patients known to be suffering from ascariasis or ankylostomiasis were removed from patients undergoing abdominal operations for various conditions. The histology of the glands obtained from this human source was then compared with that obtained from dogs suffering from natural or laboratory infections.

For details of the results obtained, the original paper should be consulted, but the following extract from the summary supplied by the author indicates the nature of the findings:—

"A) That characteristic findings are manifest in parasitic mesenteric lymphadenitis.

"B) That the histological picture of the mesenteric lymphnodes differ with the species of the parasites and that the degree of the changes is proportionate to the degree of pathogenicity of the parasite.

"C) That changes of almost identical tendencies are confirmed in both human and experimental animal cases.

" D) That the reactive manifestations of reticulum cells, mononuclear cells, plasma cells and eosinophils appeared in cases of ancylostomiasis and ascariasis. Moreover, neutrophilic leucocyte infiltration was extremely scanty.

" From these facts the concept of ' Parasitic Mesenteric Lymphadenitis ' was presented.

" Furthermore, the causes of those changes were assumed to be the following 4:

" 1) The toxic effect of the so-called ' Parasitic Toxin '.

" 2) The physical and chemical destructive effects of the in vivo wandering of the larvae.

" 3) The allergic factor.

" 4) The stimulation due to attachment.

" Abdominal pain seen in cases of parasitic disease is presumed to be due to the stimulation of the sensory apparatus of the originating portion of the mesenterium by the enlargement of the mesenteric lymphnodes. Thus, the author would like to call the attention of all clinicians to the fact that parasitic mesenteric lymphadenitis should be considered as one of the causes of abdominal pain."

R. M. Gordon

FRAGA DE AZEVEDO, J. & DE MEDEIROS, Lidia. Contribution à l'étude comparative de *Biomphalaria adowensis* Bourg. (Bailundo, Angola) et de *Biomphalaria pfeifferi* (Krauss) (Sud do Save, Moçambique), par l'anatomie des organes génitaux, considérant les deux espèces du point de vue des caractères conchyliologiques. [**Comparative Study of *Biomphalaria adowensis* and *B. pfeifferi* in Terms of the Anatomy of the Genital Organs**] *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 815-23, 9 figs. (1 on pl.).

The original should be consulted by those interested in the character and arrangement of molluscan reproductive organs as a key to species identification or separation.

POLITZER, W. M. & BEUCHAT, A. **Urinary Lithiasis in an African.** *South African Med. J.* 1957, Mar. 30, v. 31, No. 13, 311-12, 1 fig. [13 refs.]

Urinary lithiasis appears to be comparatively rare in Africans. The authors describe the case of an African adult in Portuguese East Africa who complained of difficulty and pain during micturition and defaecation. He had been treated for vesical schistosomiasis 7 years before and had had gonorrhoea 3 years before admission. At the time of admission, the presenting symptoms had been present for 2 years, but the patient had tried indigenous remedies in the meantime.

Local inspection revealed a suprapubic tumour "the size of a 4-months pregnancy". Palpation and exploration of the bladder with a sound indicated the presence of stones, and these could be felt at rectal examination. There was gross haematuria but no *S. haematobium* eggs were found. 6 large stones (wet weight, 840 gm.; dry weight, 730 gm.) were removed at suprapubic cystotomy. They were oval, compact, smooth and white in colour and were shown all to be composed of triple phosphates. The largest stone weighed 155 gm.

The patient made a good recovery, but asked for his discharge before kidney function tests could be done.

The uniform composition suggests that the stones originated in the bladder, where their size and number obstructed the urinary outflow. This is a serious complication which calls for prompt surgery to avoid renal damage.

It is suggested that schistosomiasis was a predisposing cause for the formation of the calculi. This is not usually thought to be common, but in this case the secondary infection might have resulted in increased alkalinity of the urine and precipitation of phosphates.

H. J. O'D. Burke-Gaffney

ZAHAWI, S. & SHUKRI, N. **Ectopic Schistosomiasis and Bilharzial Myocarditis.** *J. Faculty of Med., Baghdad, Iraq.* 1956, v. 20, Nos. 3/4, 56-60, 2 figs. [16 refs.]

After a brief reference to ectopic manifestations of schistosomiasis, the authors, from Baghdad, describe the case of a boy of 13 who was admitted to hospital with evidence of acute heart failure and died 16 hours later. Haematuria and granular casts in the urine were noted, but no ova were discovered in the urine. At autopsy, congestion was present in the lungs and liver, and the kidneys were enlarged and oedematous.

The heart weighed 450 gm. and was moderately dilated. There were small isolated foci of necrosis, up to 3 mm. in diameter, in the myocardium. Histological examination showed no degenerative changes in the myocardium, but there was a perivascular infiltration of mononuclears and eosinophils. No fibrosis was found in the heart and the lesions were evidently recent.

Two photomicrographs illustrate respectively a healthy ovum of *Schistosoma haematobium* in the heart muscle, with evidence of focal necrosis: and a shrunken ovum without evidence of tissue reaction.

The bladder, which was thickened and fibrosclerotic, was heavily infested with *S. haematobium* ova, but no calcification was seen.

In the absence of any other explanation for the heart failure, it is suggested that the schistosomal lesions of the myocardium were responsible. The possible mechanism is discussed.

H. J. O'D. Burke-Gaffney

OTHMAN, I. A. **Case Report of Pulmonary Bilharziasis caused by *Schistosoma haematobium*.** *J. Faculty of Med., Baghdad, Iraq.* 1956, v. 20, Nos. 3/4, 68-70.

MARKS, C. **Observations on the Surgical Sequelae of Bilharzial Disease.** *South African Practitioner.* 1956, Oct.-Nov., v. 1, No. 6, 460-70, 6 figs. [33 refs.]

This is an expanded version of the paper abstracted in this *Bulletin*, 1957, v. 54, 303. The additional information includes a number of tables of figures and photomicrographs.

FRIEDHEIM, E. A. H. Le traitement de la bilharziose urinaire à *S. haematobium* par le dimercaptosuccinate d'antimoine (TWSb). [**Treatment of *Schistosoma haematobium* Infections with Antimony-a-a'-Dimercapto-Potassium Succinate (TWSb)**] *Bull. Soc. Path. Exot.* 1956, Nov.-Dec., v. 49, No. 6, 1247-52.

TWSb [see this *Bulletin*, 1955, v. 52, 56] is a complex organic trivalent antimonial, with two attached sulphydryl groups which exert a detoxicant action on arsenic and on antimony akin to that of BAL. Mice tolerate 50 times as much metallic antimony in this form as in the form of tartar emetic. Electrocardiographic studies indicate that the antimony in TWSb does not affect adversely the cardio-vascular system; the toxic side-effects are gastro-intestinal, and sometimes cutaneous, but they always are slight and of short duration. The drug given intensively cures *Schistosoma mansoni* infections in a 2-day treatment; also when given less intensively in a treatment of 3 to 10 days' duration.

The author has treated 19 cases of *S. haematobium* infection in Morocco with the compound over periods of 4 to 8 days. The details are set out in a series of tables. No serious or prolonged side-effects resulted, but in adults there usually was vomiting; children rarely were troubled by this or other side-effects. Eggs had vanished from the urines by the 6th day in 6 cases, and by the 8th day in 9 cases. 3 patients were watched subsequently for 87 days, 2 for 107 days, 5 for 169 days, and 8 for 207. In no case did eggs reappear in their urines. A. R. D. Adams

ROWLAND, H. A. K. **The Test of Cure in Urinary Schistosomiasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Mar., v. 51, No. 2, 157-62.

Urine microscopy, hatching tests, and rectal biopsy, respectively, were examined for their efficacy in assessing cure after treatment of patients

with sodium antimony gluconate [SAG] for *Schistosoma haematobium* infections [this *Bulletin*, 1957, v. 54, 306]. The data are set out in tables. From these it seems that 100 patients were treated; 76 were apparently cured and 24 were not, as judged by the tests used. Of these tests urine microscopy over a period of 6 months proved by far the most reliable; of the 24 proven relapses only one would have been missed by reliance on this technique alone. Up to 3 months after treatment the hatching test was negative in all but one instance; after this time it became rather more effective. This suggests that SAG treatment causes the female worms to lay eggs that, though viable, are not normal. Rectal biopsy proved of no value, as not a single egg was recovered from the patients by this means within the 6 months following treatment.

The urine examinations, done if possible consecutively each day, are most profitable during 3 to 4 months after the treatment; this was when most of the parasitic relapses became evident. The tests are unprofitable before the end of the 2nd month. A follow-up to the end of a 6-month period is adequate; prolongation of the examinations beyond this period did not alter the results. Most relapses were disclosed by the end of the 4th month.

A. R. D. Adams

SCHNEIDER, J. Revue critique de la thérapeutique des bilharzioses. [Critical Review of the Treatment of Schistosomiasis] *Bull. Soc. Path. Exot.* 1956, Nov.-Dec., v. 49, No. 6, 1220-47. [61 refs.]

[This, itself, being a critical review, does not lend itself to summary and therefore should be read in the original by those concerned with the subject matter.]

There is not a single satisfactory drug which will ensure complete and definitive cure of schistosomiasis, and there is none which is both non-toxic and well-tolerated. The treatment of schistosomiasis must be considered from 2 standpoints; that of the clinician and that of the epidemiologist. The aim of the former is to cure the patient both of his disease and of his infection; that of the latter, which is the easier of achievement, is to suppress the infection sufficiently to stop its transmission.

There is a difference between the treatment of a patient not exposed to reinfection, and that of patients living in an endemic area who constantly are subject to reinfection. In the latter case radical cure is illusory; all that can be hoped for is control of the symptoms and cessation of the discharge of viable eggs. Furthermore, while individual patients may be treated, and retreated if necessary, over prolonged periods this is not practicable for the majority of the population living in an endemic region. Here only brief courses of treatment readily administrable, and repeatable at convenient intervals, are possible.

The principles of treatment are the same whichever of the 3 parasites

is concerned. The fact that *Schistosoma japonicum* has alternative reservoir hosts does complicate its epidemiological control.

There follows a classification and a considerable list of the various types of drugs employed in the treatment of schistosomiasis, with a brief historical account of each and observations on their individual effectiveness and toxicities and their various defects. This can with profit be consulted in the original paper; it largely accords with accepted opinion.

A. R. D. Adams

RADKE, M. G., SCHNEIDER, M. D. & HOUGHTALING, D. G. **Dry Weight, Nitrogen and Phosphorus Content of *Schistosoma mansoni*.** *Exper. Parasit.* New York. 1957, Mar., v. 6, No. 2, 202-7, 1 fig. [10 refs.]

WRIGHT, C. A. **Some Factors affecting the Susceptibility of Snails to Infection with Miracidia of *Schistosoma* spp.** *Bull. Soc. Path. Exot.* 1956, Nov.-Dec., v. 49, No. 6, 1211-20. [31 refs.]

In a review of the literature concerning the susceptibility of snails to infection with miracidia of schistosome species the factors are described and discussed. Such factors may be separated conveniently into 2 groups, the physical and the physiological. While it is accepted that the physical factors of light, temperature, pH, and oxygen tension must in many instances affect many of the physiological functions of the snail they are unlikely to have much influence upon natural and acquired immunity and resistance.

The author believes that darkness is likely to inhibit the activity of miracidia and thereby limit infection. [Darkness largely inhibits hatching of *S. mansoni* miracidia; this coupled with the fact that the infective life-span of miracidia may be reckoned in hours makes it unlikely that the greatest opportunity for infection can occur in darkness under natural conditions.] Temperature plays a considerable part both during the actual infection of the snail as well as during the incubation period, but the influence of pH on miracidia is not so clearly defined and little is known concerning the importance of oxygen tension. The aging of miracidia is influenced by temperature and the ability of miracidia to infect may be reduced greatly during the course of a few hours after hatching.

The overall picture of natural immunity is complicated by the existence of intra-specific resistant strains of molluscs in species normally receptive and the existence of intra-specific strains of miracidia that differ in their infectiveness to molluscs of known susceptibility. Resistance through natural immunity is best determined by the presence or absence of host tissue reactions around the invading miracidia and not by the attractiveness or otherwise of the miracidia for the snail. [Also, it is

known among workers in this field that individual miracidia of the same strain differ markedly in their degree of attraction towards the same snail.] Experimental evaluation of acquired immunity may be complicated by the onset of age resistance and while this latter condition is known to occur in some species it is less marked in others. Other types of resistance may be observed where overcrowding leads to stunted growth and there may be evidence to suggest that receptivity of the snail may relate to the stage in its sex-cycle at which opportunity for infection occurs.

O. D. Standen

BARBOSA, F. S. & COELHO, M. V. Comportamento das formas larvárias de *Schistosoma mansoni* em *Australorbis glabratus* (Mollusca Planorbidae), sujeitos à estivação. [**Behaviour of *Schistosoma mansoni* Larvae in *Australorbis glabratus* subjected to Aestivation**] *Publicações Avuls. Inst. Aggeu Magalhães*. Recife, Brazil. 1955, v. 4, 51-60, 1 graph. English summary.

This paper describes an important study on the fate of the larval stages of *Schistosoma mansoni* during the aestivation of the molluscan intermediate host *Australorbis glabratus* in Brazil.

The authors found that if the infection in the snail was of more than 25 days' duration (mature daughter sporocyst stage) before aestivation commenced then the larvae were killed by 21 days' desiccation of the host. In about 30% of the cases which had been desiccated for up to 60 days the snails survived free from infection but the remainder died. If the infection was still in the primary or immature daughter sporocyst stage (less than 25 days old) when aestivation began then the larvae were able to survive in the snail for periods of at least 90 days desiccation. When the snails once more resumed their aquatic habitat the larvae continued their development normally. The sum of the pre-desiccation period and the time lapse between the return of the snails to water and the emission of cercariae is approximately equal to the normal development time of the infection, indicating that early larval development is merely temporarily arrested by the aestivation of the host.

The authors rightly comment on the epidemiological significance of their findings. Since it is known that some of the African intermediate hosts of human schistosomes also normally aestivate it will be most interesting to know if similar results are obtained with these species.

C. A. Wright

OLIVIER, L. & BARBOSA, F. S. **Seasonal Studies on *Australorbis glabratus* Say from Two Localities in Eastern Pernambuco, Brazil.** *Publicações Avuls. Inst. Aggeu Magalhães*. Recife, Brazil. 1955, v. 4, 79-103, 2 figs. [17 refs.]

Field observations on the survival and reproduction of *Australorbis glabratus* were made in the Recife and Paulista districts of Pernambuco. Rainfall is markedly seasonal in these districts and the studies were confined to temporary bodies of water and to underlying soil exposed during the dry season. Metal dippers with 3 mm. mesh bottoms were used for snail collection from water; for collection from dry soil the vegetation, debris and soil within metre squares were examined. In Recife, where the soil dried out to a much greater extent the soil in the squares was examined to a depth of 3 cm. by sieving; in the Paulista area the top 1 cm. was examined.

In the Recife area the proportion of living to dead snails found in dry soil decreased as the dry season progressed. After the commencement of the rainy season it was obvious that only very small snails had survived desiccation and that these grew very rapidly once the optimum conditions had returned. The evidence for this was that for the first 2-3 months after flooding, the snails taken from the pools had old thick shell at the centre of the disc and new, rapidly produced thin shell towards the outside. The snail population reached its maximum density during the first half of the wet season.

In Paulista the soil remained moist in some parts of the collecting area for the whole of the 5-7 months of dry season. The findings were broadly similar to those in Recife.

It is concluded that a small proportion of snails survive the dry season, are capable of very rapid growth upon return of the water and produce a new generation. The maximum population density is reached in 50-60 days after the first heavy rains. Under these conditions the life span of most snails is less than one year although some may live 15-17 months.

O. D. Standen

OLIVIER, L. & BARBOSA, F. S. **Seasonal Studies on *Tropicorbis centimetralis* in Northeastern Brazil.** *Publicações Avuls. Inst. Aggeu Magalhães.* Recife, Brazil. 1955, v. 4, 105-15.

Study of the effects of desiccation and of reproduction in *Tropicorbis centimetralis* present in temporary bodies of water near Recife were made in the same manner as described by Olivier and Barbosa [see above]. The findings were very similar to those for *Australorbis glabratus* in that small numbers of *T. centimetralis* survived the dry season and proved capable of rapid growth once flood water returned. It was not discovered whether more than one new generation was produced in any single season. There was some slight evidence that *T. centimetralis* survived the dry season better than *A. glabratus*. Many more living snails were found at the bases of tussocks of sedge than in the open ground and it was considered that protection by vegetation and debris contributed much to resistance to desiccation.

T. centimetralis was found to reproduce throughout the year in permanent waters but marked seasonal fluctuation in population density occurred.

O. D. Standen

FRAGA DE AZEVEDO, J.; GOMES, F. C.; BAPTISTA, A. M.; DE MAGALHAES, E. M. Étude du métabolisme chez les mollusques d'eau douce. Métabolisme du phosphore, étudié avec emploi du ^{32}P [**Phosphorus Metabolism in Freshwater Molluscs**] [FRAGA DE AZEVEDO, GOMES, BAPTISTA & DE MAGALHAES]. *Bull. Soc. Path. Exot.* 1956, Sept.-Oct., v. 49, No. 5, 912-17, 8 figs. (5 on 2 pls.). L'action biologique de la radiation gamma sur des mollusques d'eau douce [**Biological Action of Gamma Radiation on Freshwater Molluscs**] [FRAGA DE AZEVEDO & GOMES]. *Ibid.*, 917-21, 4 figs. (3 on 2 pls.).

I. In their studies on the metabolism of freshwater molluscs the authors maintained 8 specimens of *Helisoma duryi normale* in a small aquarium containing 60 ml. of fresh water to which was added 40 μgm . of sodium orthophosphate labelled with ^{32}P . Each day, 10 ml. of the water from the aquarium was measured for radio-activity, account being taken of the natural decrease based on the half-life of ^{32}P . Over a period of 5 days the concentration of phosphorus in the aquarium water fell from 100% to 78%. While it was assumed that this fall in phosphorus concentration was due to absorption by the molluscs it was also realized that some would be returned to solution by excretory processes and that some may be directly absorbed by the shell. Measurement showed that the tissues contained much more radio-active material than the shell and in 5 specimens examined the radio-active material averaged 3.7 to 1. Examination of the faeces revealed that they also were radio-active.

Examination of tissue sections by autoradiography showed that the radio-active phosphate ion was localized especially in the hepatopancreas but also in the intestine, albumin gland and parenchymatous tissues. It is concluded that the molluscs are capable of absorption of phosphate ion from solution.

II. The freshwater molluscs, *Planorbarius corneus* (albinus), *P. metidjensis*, *Biomphalaria pfeifferi*, *Australorbis glabratus* and *Melania tuberculata* were exposed to gamma radiation from a ^{60}Co cobalt source of 77 millicuries yielding 2.6 roentgen per hour at 20 cm. distance. The snails were contained in several small goblet aquaria and the effects of radiation were estimated daily. Control snails were maintained in aquaria of the same type.

Melania tuberculata succumbed after exposure to 213 roentgens but it was believed that death was due primarily to insufficiency of oxygenation. The lethal exposures for the other molluscs were: *A. glabratus*, 1,200 r., *P. metidjensis* and *B. pfeifferi*, 1,750 r. *P. corneus* survived the whole

experiment and resisted exposure to 7,461 r. In the control aquaria, apart from one or two deaths the snails kept in good condition. Generally, 2 or 3 days before death the snails showed feeble response to stimulation and were torpid. Histological examination of tissues showed degeneration of nuclei characteristic of radiation effects. By further study of radiobiology the authors hope to obtain some explanation for the specific differences in resistance to gamma radiation. *O. D. Standen*

BOGLIOLO, L. **The Anatomical Picture of the Liver in Hepato-Splenic Schistosomiasis mansoni.** *Ann. trop. Med. Parasit.* 1957, Mar., v. 51, No. 1, 1-14, 10 figs. on 4 pls. [10 refs.]

Macroscopic and histological examinations were made of the livers from 21 cases of hepato-splenic schistosomiasis (*S. mansoni*) and from 33 cases of Morgagni-Laënnec's cirrhosis, 2 of "cancer cirrhosis", 2 of infective hepatitis, 1 "cardiac" liver and 18 normal livers. In selected specimens the vascular arrangements of the organs were studied by injection of coloured gelatin (into the portal vein and suprahepatic veins) and by injection of vinyl-acetate (into the portal vein, hepatic artery, suprahepatic veins and vena cava).

The cases of hepato-splenic fibrosis could be separated into "clay-pipe-stem" cirrhosis (18), diffuse schistosomal fibrosis (2) and "flint liver" (1).

Clay-pipe-stem cirrhosis is the result of chronic granulomatous fibrotic peripylephlebitis in which the connective tissue involved is that surrounding the large portal venous branches. The lesion does not usually extend to the lobules and there is little or no rearrangement of the liver structure. There is virtually no hyperplastic regeneration of the hepatic cells.

The most characteristic feature of the peripylephlebitis is the intense neoformation of blood vessels about the affected portal venous branches: the new vessels which come solely from the hepatic venous vessels surround the branches of the vein "like a mossy sleeve" [most beautifully shown in the photographs of the vinyl acetate casts].

The picture is totally different from that of Laënnec's cirrhosis or of other fibrosing diseases of the liver.

The author's views on the production of disturbances of the portal circulation by the lesion described are interesting. The disturbances are caused (i) by the rigidity and enlargement of the portal venous vessels following fibrosis and retraction by the periportal connective tissue; (ii) by diminished contractility of the portal branches due to partial inflammatory destruction of the smooth musculature; and (iii) by increase of the periportal capillary system by neoformation of a vast capillary network, the supplementary vascular channels thus formed presumably causing a sudden fall in the velocity of the portal blood. The mechanism whereby

the portal circulation is disturbed is therefore essentially different from that in Morgagni-Laënnec's cirrhosis and infectious hepatitis.

"The preservation of the lobular architecture, the presumably uniform flow of blood in the majority of the lobules, and the absence of any morphological signs indicating that the hepatic cells are being directly involved, all suggest that in most cases of hepato-splenic schistosomiasis *mansoni* the hepatic functions are less modified by the infection, or are preserved for a longer period, than in other forms of liver disease, such as infectious hepatitis or Morgagni-Laënnec's cirrhosis, in which the structural architecture of the organ is changed, and in which there are grave regressive lesions in the hepatic cells."

[This is a fascinating paper which should be read carefully by all those interested in the subject.]

B. G. Maegraith

G. E. N. Caracas. 1955, July-Dec., v. 10, Special No. **Schistosomiasis mansoni**. [Schistosomiasis due to *S. mansoni*]

This book was reviewed on p. 897.

MAO, S. P. & LYU, K. L. [Studies on Cultivation of *Schistosoma japonicum*] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26. No. 2, 166-72, 1 fig. [In Russian.]

The English summary appended to the paper is as follows:—

"1. Adult schistosomes survive better in serum media than in those containing blood cells or haemoglobin, better in the mule serum than in the sera of the horse, cattle, sheep or donkey, in a serum diluted with Tyrode's solution than in a plain serum, in media with glucose than without.

"2. The addition of penicillin and streptomycin in the concentration of 50 units each per ml of culture medium helps to keep the culture sterile even when aseptic precautions are not strictly observed. The above-mentioned antibiotics in the concentration of 1000 units each per ml of medium produces no harmful effect on adult schistosomes in vitro.

"3. Under cultural conditions, degeneration of adult schistosomes can be reduced to a minimum by frequent change of culture medium, especially when liver extract is added to serum-Tyrode-glucose mixture.

"4. In artificial media composed of glucosed Tyrode's solution and vitamin B complex or ascorbic acid but devoid of serum or other body fluids, the maximum period survival of adult schistosomes observed is 5.95 days. This period is longer than any reported so far.

"5. For the first time in medical literature, development, however, slight, of immature schistosomes has been observed under culture conditions."

GASCHEN, H., MATTHEY, G. & JOMINI, P. Un cas de dermatite des nageurs sur les rives du Lac Léman. [**A Case of Swimmers Itch from the Banks of the Lake of Geneva**] *Bull. Soc. Path. Exot.* 1956, Nov.-Dec., v. 49, No. 6, 1172-7, 2 figs. on pl. [15 refs.]

The author describes a case of dermatitis, occurring in a young man, which was due to penetration of the skin by the cercariae of *Echinostomum* sp. discharged from fresh water snails, *Lymnaca stagnalis*, which were breeding in the Lake of Geneva.

R. M. Gordon

CHEBOTAREV, R. S. [**Schistosomal Dermatitis of Man**] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 2, 172-5, 2 figs. [14 refs.] [In Russian.]

The English summary appended to the paper is as follows:—

“The freshwater molluscs *Galba truncatula*, *Planorbis planorbis*, *Radix anricularis*, etc. caught in the ponds of the floodplain of the Dnieper (Kiev district) were found to be infested to a large extent with rediae and cercariae of trematodes (near the pond there was a poultry farm where ducks, geese and hens were kept).

“When catching the molluscs, the catchers' legs submerged in the water were attacked by the cercariae of schistosomatids, which later resulted in local dermatitis. The skin began strongly to itch, papulae the size of a hemp seed and larger appeared and were followed by reddening of the skin around the papulae. On the 3rd-4th day the papulae turned bright red and in the centre of each appeared a small eschar of ulcer. On an average the papulae disappeared 2.5-3 weeks later. A microscopic study of skin scrapings from legs made on the second day after the itching began, revealed the tails of cercariae.

“Similar dermatitis was sometimes observed among local inhabitants, poultry farmhands, fishermen, haymakers, etc.”

Hou, Pao-Chang. **The Relationship between Primary Carcinoma of the Liver and Infestation with *Clonorchis sinensis*.** *J. Path. & Bact.* 1956, July, v. 72, No. 1, 239-46, 22 figs. on 6 pls. [14 refs.]

The author first cites a number of authorities who have drawn attention to the association of primary carcinoma of the liver with *Clonorchis sinensis* infection; none of these believes, he adds, that the “final word has yet been said”. He proceeds to say it.

During the 7 years he has studied 200 necropsies of primary carcinoma of the liver in Hong Kong and in 46 of these there was clonorchiasis without cirrhosis. “Further investigation afforded clear evidence of relationship in 30 of them (67 per cent.) between clonorchiasis and the primary carcinoma.” In 15 cases the condition was so far advanced

that the stages of the malignant changes in the bile-ducts were no longer distinguishable, but the study has been confined "to the 30 unimpeachable cases". [The 46th case is not accounted for.]

There were 28 males and 2 females: ages were from 36 to 76 years.

There was jaundice in 37%, ascites in 63% and oesophageal varices in 27%.

Every stage of development of cancer was present. "The earliest stage of malignancy appeared on cross-section either as well-circumscribed, minute pale-greyish granules (1 to 3 mm.) attached to parts of bile-ducts, or in the form of annular thickening (up to 4 mm.) of the duct walls . . . ; with the progress of malignant change, the nodules were bigger and the annular thickening greater." There were many bile-ducts affected in each case and the conditions were not always confined to one lobe. In the cases of large nodules the bile-ducts were no longer visible. "The only bile-ducts which showed malignant changes were the intrahepatic ducts of the second order, with a lumen between 1 and 4 mm."

The growth is primarily and mainly an adeno-carcinoma, and its histological features on the whole conform to those of other kinds of carcinoma of the intrahepatic bile-ducts, except for the frequent and sometimes extensive mucinogen infiltration, and the tendency to undergo squamous metaplasia.

Clonorchis sinensis was discovered in the bile-ducts of 28 patients, but in only 3 instances were they in the bile-ducts that had undergone malignant changes.

The average weight of the spleen was 141 gm. Metastases were found in the lymph glands in 28 cases, in the lungs in 21, in the adrenals in 9, in the diaphragm and omentum each in 6 cases, in the heart, kidney and bone each in 4 cases, in the brain and gall bladder each in 3 cases, in the meninges in 2 cases, and in the pancreas, colon and mesentery each in 1 case.

[It is not possible to do justice to this important study in a summary, especially as there are 7 photographs and 15 photomicrographs; these are all excellent and well reproduced. A few more epidemiological details such as the percentage incidence of clonorchiasis in the hospital male population and in the total necropsy population would have been welcome. Further, in his selection of his material, the author appears to have pre-judged his case.]

L. E. Napier

FAIN, A. & VANDEPITTE, J. **A New Trematode, *Poikilorchis congolensis*, n.g., n.sp., living in Subcutaneous Retroauricular Cysts in Man from the Belgian Congo.** [Correspondence.] *Nature*. 1957, Apr. 6, v. 179, 740, 1 fig.

YARWOOD and ELMES [this *Bulletin*, 1943, v. 40, 704] observed a retro-auricular cyst in a Nigerian patient, which contained operculated

eggs resembling the eggs of *Paragonimus*. Recently Vandepitte discovered, in 4 Africans of Kasai Province, Belgian Congo, retro-auricular cysts or abscesses which contained eggs resembling those of *Paragonimus westermani*, except that they were smaller. An adult worm extracted from one of the cysts did not belong to the family Troglotrematidae [to which *Paragonimus* belongs], but to the family Achillurbainiidae, which is at present represented only by one species, *Achillurbainia nouveli*, found in an abscess of the upper eyelid of a Malayan leopard.

The authors consider that the parasite they found belongs to a new genus and species, to which they give the name *Poikilorchis congolensis*, n.g., n.sp. A photograph of its eggs illustrates their paper. Formalin specimens of this trematode are brown, flattened, 7.6 mm. long and 3.9 mm. wide. The other diagnostic features of the new species are given in detail. The new genus is distinguished from *Achillurbainia* by the facts that its testes are irregular in shape, its caeca have very numerous, short folds, its "receptaculum testis" is small, bilobate and median, the genital pore is paramedian and the ovary is ovoid.

None of the 4 patients from Kasai had pulmonary paragonimiasis or eggs in the sputum, but 2 of them lived in villages where "so-called pulmonary paragonimiasis" had been observed. The authors refer to a case in the Cameroons reported by LIBERT [*ibid.*, 1932, v. 29, 412], and consider that some cases reported as pulmonary paragonimiasis are in fact caused by the new species here described. *G. Lapage*

REINHARD, E. G. **Landmarks of Parasitology. I. The Discovery of the Life Cycle of the Liver Fluke.** *Exper. Parasit.* New York. 1957, Mar., v. 6, No. 2, 208-32, 7 figs. [Numerous refs.]

ROWAN, W. B. **The Mode of Hatching of the Egg of *Fasciola hepatica*. II. Colloidal Nature of the Viscous Cushion.** *Exper. Parasit.* New York. 1957, Mar., v. 6, No. 2, 131-42, 2 figs.

"1. A viscous and granular cushion of material at the opercular end of the fully developed egg of *Fasciola hepatica* expands within the egg just prior to the release of the operculum during normal hatching. This expansion is shown to play a passive role in the hatching phenomenon.

"2. The cushion resembles a colloid and consists at least in part of protein. It changes from a contracted gel to an expanded sol with changes in the ion constitution of the fluid bathing it.

"3. Evidence is presented to show that expansion of the cushion within the unhatched egg is accompanied by osmosis of salts or other materials from the egg. This exosmosis is believed to result under natural conditions from damage to or destruction of the vitelline membrane by the direct or indirect action of the hatching enzyme.

"4. Expansion of the cushion within the egg can be artificially induced by exposing the egg to heat or to toxic solutions. This change provides a valuable visual clue to the penetrability to toxic materials and may play a useful role in ovicide research." [See this *Bulletin*, 1956, v. 53, 1361.]

GALLAIS, P., RUZIÉ, J. & DAR COURT. La cysticercose cérébrale. Considerations cliniques biologiques et perspectives thérapeutiques actuelles. [**Clinical, Biological and Therapeutic Observations on Cerebral Cysticercosis**] *Arch. Méd. Gén. et Trop.* 1955, May-June, v. 32, No. 3, 83-93, 3 figs.

The authors reported two cases of cysticercosis in which Notézine (diethylcarbamazine) was given with favourable results.

The first patient was a soldier aged 33 with 15 years' service, who had both diurnal and nocturnal fits. The diurnal crises began with auditory hallucinations, flashes of colour, incoherent speech, clonic and tonic spasms followed by weakness or paralysis of the limbs, unconscious micturition, and partial or total loss of consciousness, which lasted for 10 minutes, or so, and was followed by a period of malaise. Personality changes were noted. Subcutaneous nodules were distributed widely: biopsies of these showed typical cysticercal cysts. X-ray of the head showed several opacities in the frontal region, one in the right parietal near the vertex, and one in the region of the pineal. The EEG suggested a lesion deep in the left temporo-occipital region.

A 10-day course of treatment with Notézine (4 tablets daily) combined with the anti-histaminic Phenergan [promethazine] was given; on the second day of treatment a red pruriginous rash appeared on the patient's limbs, and on the third day he had a fit and was admitted to hospital. No neurological symptoms followed the fit and the rash quickly disappeared, but on the sixth day he passed a tapeworm. A few days later he had a second course of treatment: he had a fit on the fifth day, but it was less severe. The subcutaneous cysts now started to diminish in size and regression continued until they completely disappeared. He then left Paris, but his doctor reported that the fits became much less frequent and less severe.

The second case was that of a soldier aged 36 years; he was admitted for convulsive crises. He had the first fit about 6 years before admission, since when he had had 6-8 fits. The prodromal symptoms were irritability and frontal and occipital headaches for 2 to 3 hours and just before the fit flashes of light in the left eye. He did not usually fall because of the warning given by the prodromal symptoms, or bite his tongue, nor was he incontinent during attack. He complained of loss of memory, asthenia, somnolence, headaches, and lower back pain.

He gave a history of *Taenia solium* infection over a long period, up to 6 years, previously and of small cysts under the skin all over the body; these had disappeared.

X-ray showed numerous small calcified ovoid objects, 1 cm. long by 2 to 3 mm. broad, in the muscles all over the body. He discharged himself from hospital but was re-admitted 5 months later with all his symptoms increased; he was completely confused, without memory, and unable to carry out any orders.

Treatment consisted of 4 tablets of Notézine daily, with an anti-histaminic to control the reactions, for 28 days. All symptoms disappeared completely and his mental condition was much improved. The eosinophil count was materially reduced and there was an improvement in the cerebrospinal fluid.

The authors consider that there is evidence of very considerable improvement in these two cases of the racemose type of cyticercosis.

L. E. Napier

MAZZOTTI, L. & MÉNDEZ, D. El difentano 70 en el tratamiento de las teniasis humanas. [**Diphenthane 70 in the Treatment of Human Taeniasis**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1956, June, v. 16, No. 2, 9-14, 6 figs. English summary (2 lines).

Several reports have been published on the use of Diphenthane 70 (2-2 dihydroxy-5:5-dichlorophenylmethane) as an anthelmintic in domestic animals.

The present authors, in Mexico, have given this drug orally to 49 patients with taeniasis. The drug was given in a single dose to fasting patients and appears itself to have a laxative effect. 33 patients received doses varying between 46 and 59 mgm./kgm. and 21 of them were found to be free of proglottides at the 3-months follow-up examination. 16 had higher doses (70 to 250 mgm./kgm.) and 13 of them were similarly negative. 5 of the patients had the highest doses (200-250 mgm./kgm.) and 3 of them showed signs of toxicity. Otherwise, the drug appeared to be well tolerated. There were 7 children of 7 years old or less who received doses proportionately as great or greater than those given to adults.

The authors consider that this drug approaches to an ideal anthelmintic for taeniasis as it is effective but yet appears to have little toxicity.

[See also this *Bulletin*, 1957, v. 54, 63.] *H. J. O'D. Burke-Gaffney*

DE PRADA, J. El quiste hidatídico en Badajoz. [**Hydatid Disease in Badajoz**] *Rev. Sanidad e Hig. Pública.* Madrid. 1956, Nov.-Dec., v. 30, Nos. 11/12, 798-803, 4 maps.

DELON, J. & GEFFROY, A. Les kystes hydatiques de l'enfant au Maroc. [**Hydatid Cysts in Children in Morocco**] *Maroc. Méd.* 1957, Apr., v. 36, No. 383, 329-39, 13 diagrams.

An account of 36 cases, 24 of them being pulmonary.

LARGHERO YBARZ, P. Quiste hidático del ventrículo izquierdo. 10 casos tratados en el Uruguay. [**Hydatid Cyst of the Left Ventricle in Uruguay**] *Arch. Uruguayos de Med., Cirug. y Especialidades*. 1956, Oct.-Nov.-Dec., v. 49, Nos. 4, 5 & 6, 327-37.

An account of 10 cases.

WATSON, J. M. & AL-HAFIDH, R. **A Modification of the Baermann Funnel Technique, and its Use in establishing the Infection Potential of Human Hookworm-Carriers.** *Ann. Trop. Med. & Parasit.* 1957, Mar., v. 51, No. 1, 15-16.

The original but somewhat cumbersome apparatus devised by BAERMANN [this *Bulletin*, 1918, v. 12, 181] for the extraction of hookworm and other nematode larvae from soil or faecal material is still widely used. RUGAI *et al.* [*ibid.*, 1955, v. 52, 805] introduced a simplification of the original Baermann technique, but the present authors found that this simplified technique, although it required only a single, compact piece of apparatus, had the disadvantage that the mouth of even a large conical flask allowed the use of only a small container, so that only a small quantity of faeces or soil could be examined at any one time; and that, although collection of the larvae with a Pasteur pipette was an advantage, a relatively large volume of fluid in which the larvae had collected had to be sucked up and it took time to collect all the larvae, it being necessary to sediment or concentrate them as well.

They therefore fitted a wire-gauze basket into the top of an ordinary conical urine glass, the basket having flanges bent over at each side to hold it in position. The comminuted sample to be examined was then put in a double layer of cheese-cloth lining the basket, and water slightly above blood heat was introduced gently into the urine glass, down its side between its rim and the wire basket, till it reached just above the bottom of the sample. The apparatus was then left for about an hour. The larvae sank to the bottom of the urine glass, where they formed a concentrated sediment easily removed with a Pasteur pipette. In very warm weather a small piece of ice may be put on top of the sample.

The advantages of this method are that a relatively wide wire basket can be used, so that large samples can be examined at one operation; only a single piece of apparatus is needed; the larvae are concentrated into a sediment that is easily removed with a minimal amount of water, so that further concentration is not needed. The method has been found to be just as reliable as the method of Baermann or Rugai *et al.* and it is simpler and quicker.

The authors have used it chiefly to establish the infection-potential of human hookworm carriers. With measured quantities of fresh faeces and a standard technique, the method can be used to establish and compare the danger of infected persons to the community by measuring the number of viable eggs that develop into larvae. This is more

important than to count the number of eggs passed, because many of these may not be viable.

The authors worked in Iraq, where infection with *Ancylostoma duodenale* is very common and infection with *Strongyloides stercoralis* is not rare.

G. Lapage

SAZ, H. J. & HUBBARD, Jeanette A. **The Oxidative Decarboxylation of Malate by *Ascaris lumbricoides*.** *J. Biol. Chem.* 1957, Apr., v. 225, No. 2, 921-33, 3 figs. [29 refs.]

JEZIORAŃSKA, Alicja & DOBROWOLSKA, Halina. Odczyn immunologiczne w glistnicy. [**Serological Test in Ascariasis**] *Med. Dośw. i. Mikrob.* Warsaw. 1957, v. 9, No. 2, 167-77. [16 refs.]

The English summary appended to the paper is as follows:—

“Saline extracts of fresh and dried ascarides (human and hog), of *Trichinella* cysts and of intestinal form of *Taenia saginata* were prepared as well as three chemical fractions of *Ascaris suis*. Complement fixation tests were carried out with homologous and heterologous immune sera as well as with the sera of infected patients, using the antigens prepared. Cases of *Ascaris lumbricoides*, *Trichocephalus dispar*, or *Oxyuris vermicularis* infestation were investigated. It was demonstrated that in the course of intestinal infection of man by *Ascaris lumbricoides* serological tests were without any diagnostic significance. More sensitive, comparatively, were antigens of human ascarides. With rabbits experimentally infected by means of eggs of *Ascaris suis* the presence of antibodies was demonstrated during the period of larval migration. The antibodies were most abundant between the 9th and 24th days after infection.

“The antigens of fresh and dried parasites showed no difference in serological activity. Plain saline extracts were more active than any of the chemical fractions.”

JIMÉNEZ GARCÍA, R. Oclucion intestinal por *Ascaris lumbricoides*. [**Intestinal Occlusion by *Ascaris lumbricoides***] *Rev. Hosp. del Niño.* Lima. 1956, Sept., v. 18, No. 67, 227-48, 3 figs. [30 refs.]

A general account with observations on 5 cases.

PEÑA-CHAVARRÍA, A., LIZANO, Cecilia & XIRINACHS, Hilda. Uso del citrato de piperacina en la ascariasis de enfermos con fiebre tifoidea. [**Use of Piperazine Citrate in the Treatment of Ascariasis in Patients with Typhoid Fever**] *Rev. Biología Trop.* San José, Costa Rica. 1956, Dec., v. 4, No. 2, 151-5. [10 refs.]

The English summary appended to the paper is as follows:—

“A clinical-parasitological study is presented of the effects of

piperazine citrate on 36 typhoid fever patients heavily parasitized by *Ascaris lumbricoides*. The patients' ages ranged from 4 to 70 years.

"Total doses varied from 1.5 to 6 grams.

"Complete negativization was achieved in 20 patients on whom coprological records were kept.

"The treatment is considered valuable, especially in reducing the danger of intestinal perforation by *Ascaris*, which would be greater in typhoid fever cases."

[The substance of this paper also appears in *Ztschr. f. Tropenmed. und Parasitol.*, 1957, v. 8, 200.]

YOELI, M. **Observations on Agglutination and Thigmotaxis of Microfilariae in Bancroftian Filariasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Mar., v. 51, No. 2, 132-6, 3 figs.

"(1) Phenomena interpreted as agglutination and thigmotaxis of microfilariae were observed *in vitro* in heparinated venous blood from a number of *W. bancrofti* carriers, recent immigrants from Cochin, India.

"(2) Distinct patterns of 'Medusa head' and 'sunflower' formations of the agglutinated masses of microfilariae were noted. A very marked diminution of microfilariae from the blood after clumping has taken place, was clearly evidenced in 11 out of 12 infected blood samples examined.

"(3) The strict dependence of the agglutination phenomenon on the amount of anticoagulant (heparin) in the blood was clearly established.

"(4) Failure of fibrinogen clots and thrombocyte suspensions to induce by themselves microfilariae agglutination was noted in experiments *in vitro*.

"(5) A partial release of microfilariae of *W. bancrofti* into the peripheral blood, during the day, as a result of intravenous heparin injections, has been achieved in three out of four cases.

"(6) The relation of the microfilariae agglutinating phenomenon to filarial periodicity is discussed in the light of the experimental findings."

MINNING, W. & MCFADZEAN, J. A. Serologische Untersuchungen bei tierischen und menschlichen Filariosen mit Antigenen von *Dirofilaria immitis* und *Setaria cervi*. [**Serological Investigations on Animal and Human Filariases with Antigens from *Dirofilaria immitis* and *Setaria cervi***] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart, 1956, Nov.-Dec., v. 7, No. 4, 419-34. [14 refs.]

This paper cannot be summarized briefly; for details the original must be consulted.

The authors had found that an alcoholic total antigen from *Dirofilaria immitis* gave, in complement-fixation reactions with sera of people

infected with filarial worms, clinically useful results, *i.e.*, they reacted specifically; but they did not always give positive results with sera of dogs infected with *D. immitis*, some of which had microfilariae in their blood. Thus the antigen did not give uniformly positive reactions in homologous infections and this fact was investigated by the authors. They briefly discuss the literature on the subject.

The antigens used were alcoholic extracts of dried and powdered *D. immitis* and *Setaria cervi* or alcoholic extracts of these worms after previous treatment of the material with acetone or ether. The methods of preparation of the antigens are described. With them the authors studied the complement-fixation reactions with sera from dogs with homologous infections, dogs infected with *Dirofilaria repens*, monkeys infected with *Dirofilaria aethiops* and human sera from patients in Gambia, a few of whom had in their blood microfilariae of *Wuchereria bancrofti* or *Dipetalonema perstans*, or both, while others had no microfilariae. The complement-fixation technique was based on that of FAIRLEY [this *Bulletin*, 1931, v. 28, 679].

The authors found that, during the prepatent period of the infection with *Dirofilaria*, all the animals tested showed a positive complement-fixation reaction, but that, during the patent period, especially after many weeks, the reaction was sometimes negative, even though the blood contained microfilariae. The total alcoholic extract of *D. immitis* was more useful than antigen made by treatment of the worm material with acetone or ether before extraction with alcohol.

The authors compare an alcoholic total antigen from *D. immitis* and a similar one from *Setaria cervi*, as regards their reactions with sera of patients in Gambia.

A *Setaria* antigen, prepared by previous treatment of the worm material with ether or acetone, seemed to be useful for the diagnosis of human filarial infections.

G. Lapage

See also p. 1007, BUDDEN, **Natural History of Onchocerciasis.**

HÜBNER, O. Über Oxyurenggranulome in der Bauchhöhle. [**Intra-Abdominal Enterobiasis**] *Deut. med. Woch.* 1957, May 3, v. 82, No. 18, 743-4, 3 figs. on pl.

Intense infections with *Enterobius* were common in Germany in the hard times after 1945 but by 1955 they were less frequent. They can still cause trouble, however, especially by perineal eczema and secondary infections. One complication which is little recognized is the penetration of the worms into the female peritoneal cavity, presumably through the Fallopian tubes, without or with bacterial accompaniment. Two cases observed by the author are described.

(1) A 13-year-old girl, previously often infected with *Enterobius* was admitted to hospital with a 4-day history of abdominal pain and symptoms

somewhat like appendicitis. At operation the appendix was only slightly thickened and infected and there was no increase of peritoneal exudate, but there was a mass, as big as an almond, attached to the omentum; this was excised. Histologically, the mass consisted of numerous abscesses containing eosinophils and oval structures 53–57 μ across resembling *Enterobius* eggs.

(2) The second patient was a 43-year-old woman with uncharacteristic lower abdominal pains for 14 days. A plum-sized tumour was found in the omentum, adherent to the transverse colon. There were also many small masses on the small and large intestines and in the pelvis. Histologically the masses contained abscesses around eggs and remnants of cuticle.

A third case is also mentioned of a 13-year-old girl with an abscess on the omentum containing eosinophils and ova. It is recommended that in cases suspected of appendicitis, a differential leucocyte count should be made to detect eosinophilia. [It is not clear if this would affect the decision whether or not to perform laparotomy.] F. Hawking

GELLER, E. R. [**Trichinellosis of Wolves in the Kursk Region**] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 2, 161–3. [In Russian.] English summary.

OZERETSKOVSKAYA, N. N. & USPENSKY, S. M. [**Group Infection by Trichinellosis from the Meat of White Bear in the Soviet Arctic Region**] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 2, 152–9, 2 figs. [Numerous refs.] [In Russian.]

The English summary appended to the paper is as follows:—

“Trichinellosis in 3 out of 6 members of a Polar expedition on the Bennet’s island (De Long’s islands) is described. It took place in August–September 1956. The patients were infected as a result of eating the meat of a white bear (*Thalarcos maritimus* Phipps) which was killed on Bennet’s island. High fever, muscular pains, edema of the face, skin eruptions and eosinophilia up to 24–88% were noted. The diagnosis of trichinellosis was confirmed by immunological reactions and by revealing the larvae of *Trichinella* in the meat.

“The food connections of the animals of Bennet’s island are reported which explain the possible routes of transmission of trichinellosis in the Arctic regions.

“The most important sources of infection of white bears are probably mammals—polar foxes.

“Most likely there is also a possibility of transmission by polar birds of prey.

“Infection by trichinella in the Soviet Arctic region is described for the first time. It shows the presence of a natural source of infection in

the North-Eastern part of the Soviet Union. Wide migration of Arctic animals, particularly of white bears, excludes the possibility of existence of isolated infected areas of trichinellosis in the Arctic region.

"The wide exploration of the Arctic region demands detailed investigation of transmission of trichinellosis among the wild polar animals and also among the population of the Arctic region. It is important to warn the members of Arctic expeditions about the danger of infection by *Trichinella*."

WU, L. Y. & KINGSCOTE, A. A. **Studies on *Trichinella spiralis*. II. Times of Final Molt, Spermatozoa Formation, Ovulation, and Insemination.** *Canadian J. Zool.* 1957, Apr., v. 35, No. 2, 207-11, 4 figs. (2 on 2 pls.).

LAPAGE, G. **Mönnig's Veterinary Helminthology and Entomology.**

This book was reviewed on p. 771.

DEFICIENCY DISEASES

DEAN, R. F. A. **Some Problems of the Nutrition of the Pre-School African Child.** *Central African J. of Med.* 1957, Feb., v. 3, No. 2, 58-61.

This is the text of a paper read to the African Regional Committee of WHO. It discusses the problems of child health in very broad outlines—developments in agriculture, the introduction of new foods, education for mothercraft, the use and abuse of nursery schools, the planning of new towns and the importance of a sympathetic appreciation of taboos, ancient and modern. The paper ends with this wisdom: "Somehow the desire for change must be evolved within the African consciousness, because until that evolution occurs any change is likely to be regarded as no more than another foreign imposition."

R. Passmore

ROGOWSKY, M. Étude de la conduction auriculo-ventriculaire et intra-ventriculaire chez le rat en carence expérimentale vitaminique du groupe B (Thiamine—Riboflavine—Pyridoxine). [**A Study of Auriculo-Ventricular and Intraventricular Conduction in Rats with Experimental Deficiency of the Vitamin B Group (Thiamine, Riboflavine and Pyridoxine)**] *Ann. Soc. Belge de Méd. Trop.* 1956, Oct. 31, v. 36, No. 5 bis, 729-61, 18 figs. on 13 pls. [Numerous refs.]

Synthetic diets were given to 4 groups of rats, and thiamine, riboflavine and pyridoxine each excluded from the diet of one group. The

following changes were observed in the time intervals of the electrocardiograms:

	P-R	QRS (time in milliseconds)	Q-T
Control rats	46	13.2	75
Thiamine-deficient rats	56	17.4	94
Riboflavine-deficient rats	48	15.6	84
Pyridoxine-deficient rats	47	13.6	74

It will be seen that in the animals deficient in thiamine there is well-marked evidence of slowing of conduction in both the auriculo-ventricular and ventricular tissue. There was no evidence of disturbance in conduction rates in the rats deficient in pyridoxine.

Histological studies showed that in thiamine deficiency there was interstitial oedema in the subendocardium, especially in the right ventricle. Here the cells were swollen and the nuclei enlarged. The conducting tissue bundles were less well stained and the cells swollen and enlarged. These changes were not seen in the control rats or in those on the pyridoxine- and riboflavine-deficient diets.

The results are discussed in relation to the cardiac changes in human beriberi and the concept of acetylation of choline and the importance of the threshold of activity of acetylcholine in the course of beriberi.

R. Passmore

HORWITT, M. K., HARVEY, C. C., ROTHWELL, W. S., CUTLER, J. L. & HAFFRON, D. **Tryptophan-Niacin Relationships in Man. Studies with Diets deficient in Riboflavin and Niacin, together with Observations on the Excretion of Nitrogen and Niacin Metabolites.** *J. Nutrition*. 1956, Oct., v. 60, Suppl. 1, 43 pp., 2 figs. [Numerous refs.]

This paper describes an attempt to measure quantitatively the extent to which tryptophan can replace niacin in the body. Some 40 patients in a mental hospital were kept for periods up to 90 weeks on diets containing known amounts of niacin and tryptophan. Although some of the diets were low in niacin, none of the patients developed pellagra. The urinary excretion of N-methylnicotinamide was measured. It was concluded that about 60 mgm. of tryptophan were equivalent to 1 mgm. of niacin in raising the excretion of N-methylnicotinamide. From this finding and a study of the literature of experimental pellagra in man, it is suggested that in order to prevent pellagra, a diet of 2,000 Calories should contain 8.8 niacin equivalents, one niacin equivalent being either 1 mgm. of niacin or 60 mgm. of tryptophan. For each addition of 100 Calories to the diet, 0.44 niacin equivalents should also be added.

[This long paper contains a mass of information on concentrations of the various end products of niacin metabolism in the urine by patients on different diets. The general conclusion about niacin and tryptophan requirements set out above is based on many years of study of the problem and much experimental work. It would appear to be justified

by the data available, but obviously cannot be applied rigidly under all circumstances.]

R. Passmore

GOTTLIEB, A. & KOCHMAN, R. [**Hypoalbuminaemia, Oedema and their Treatment in 50 Cases of Malnutrition in Infants**] *Harefuah*. Jerusalem. 1957, Apr. 15, v. 52, No. 8 [in Hebrew 193-7. (18 refs.) English summary 197].

The English summary appended to the paper is as follows:—

“ Among 231 cases of malnutrition treated in our wards during the year 1950-51 there were 50 with serum albumin of 2·5 Gm% or less. Of these 50 cases 18 had marked edema. In 26 infants up to the age of 7 months only 4 had edema, while among the remaining 24 cases over the age of 7 months, 14 had edema. The incidence of edema was not related to the serum albumin.

“ Among 19 cases admitted during the months November-February, 12 had edema. Of 31 cases admitted during the months March-October only 6 had edema.

“ Of the 50 cases 6 died. In all cases where post mortem was done, fatty degeneration of the liver was found.

“ In mild cases dietetic treatment was sufficient. However, in severe cases we gained the impression, that without parenteral treatment with blood plasma and amino-acid infusions the chances of survival would have been less.

“ The serum proteins usually reached normal levels 3-4 weeks after the start of treatment.

“ The different theories of malnutrition are reviewed and the values of serum proteins in relation to edema are discussed.”

BAKKER, ANNA W. I., BLIEK, A. & LUYKEN, R. **The Serum Proteins of Malaria-Free Inhabitants of Central Netherlands New-Guinea.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Mar., v. 9, No. 1, 1-8. [Numerous refs.]

The level of serum proteins was estimated in 49 members of a Papuan tribe in Central Netherlands New Guinea. Malaria was non-existent and worm infection not intensive among them. Total protein was 7·5, albumin 3·2, alpha₁ globulin 0·4, alpha₂ globulin 0·7, beta globulin 0·9 and gamma globulin 2·3 gm./100 ml. of serum respectively. Total protein content was similar to European standards. The lower albumin content may result from insufficient dietary protein. Gamma globulin levels were higher than in Europeans. A racial influence may perhaps contribute to these differences.

R. Passmore

HOLEMANS, K. & LAMBRECHTS, A., with the technical assistance of H. MARTIN. **Nitrogen Metabolism and Fat Absorption in Malnutrition and in Kwashiorkor.** *J. Nutrition.* 1955, Aug. 10, v. 56, No. 4, 477-94, 2 figs. [39 refs.]

The authors studied the nitrogen metabolism of 26 children and 3 adults with general malnutrition or kwashiorkor in the Kwango area of the Belgian Congo. Most of the children were infected with hookworms and malaria; all were anaemic. The children were in 2 groups—kwashiorkor and chronic malnutrition (in whom 1 or more of the signs of kwashiorkor were absent); 2 diets were given, one containing animal protein and the other vegetable protein. The calorie intake varied widely with the appetite of the patients and their distaste for food. "We emphasize the fact that the diets used in these studies were not kwashiorkor-inducing but did have a more or less therapeutic value." The faeces and urine were collected daily and analysed for nitrogen and fat; 44 balance studies were made.

The results showed that nitrogen retention was roughly proportional to intake (about 50%)—in severe cases, even a few days before death, the children could retain amounts of nitrogen proportional to the intake. The optimum retention (60%) was observed when the mean diet provided about 450 mgm. of nitrogen per kgm. daily.

The malnourished subjects showed higher excretion of nitrogen in the stools than European children, namely about 20% of the ingested nitrogen; they wasted by the bowel twice as much as white children. Metabolic faecal nitrogen, however, was normal at 30 mgm. per kgm. of body weight daily. Vegetable protein was absorbed and retained as efficiently as animal protein. Fat absorption (80%) was lower than in normal children (95%).

The authors discuss their findings, and conclude that in these children digestion was impaired, but intestinal absorption was normal. They point out that the finding that vegetable proteins (peanuts, soya beans) are retained as well as animal proteins is valuable in the prophylaxis and treatment of kwashiorkor, as was previously shown by DEAN [*this Bulletin*, 1953, v. 50, 141].

Charles Wilcocks

KHO LIEN-KENG, POESPONEGORO, S. D. & POEY SENG HIN. **The Bone Marrow Picture of Kwashiorkor in Djakarta.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Mar., v. 9, No. 1, 69-83, 7 figs. [Numerous refs.]

This paper describes the bone-marrow in kwashiorkor and differential counts of the cells in 50 smears are recorded. A uniform picture was not found, for whereas the majority of the marrows were normoblastic, a few were megaloblastic. A decrease of cellularity, especially of the erythropoietic tissue, and an increase of fat and reticular cells, endothelial

cells, plasmocytes and fibrocytes was often striking. Pathological megakaryocytes were seen in many instances, sometimes associated with thrombocytopenia and once with purpura.

The anaemia is frequently attributable to an insufficiency of bone-marrow arising as part of the general damage to organs and enzyme systems caused by a deficiency of protein and other substances. Sometimes grave liver damage and also iron deficiency contribute to the defect in the bone-marrow.

[This is a very thorough investigation and an important contribution to the pathology of kwashiorkor.]

R. Passmore

OOMEN, H. A. P. C. **The Relationship between Liver Size, Malaria and Diet in Papuan Children.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Mar., v. 9, No. 1, 84-93, 1 fig. [15 refs.]

It is established that enlargement of the liver occurs frequently in children living on poor diets and probably also as a result of malarial infections alone. This paper discusses the effects of both factors on liver size. Field surveys have been made in diverse indigenous communities in New Guinea, in which the degree of enlargement of both the liver and spleen were recorded in large numbers of children. It is concluded that a child with a bad diet, aggravated by chronic malaria, as judged by an enlarged spleen, has a larger liver than the child suffering from malaria alone. Often the left lobe of the liver was found to be more enlarged than the right. The significance of this is not clear.

It is important to assess the liver enlargement in at least two planes. The author measures liver enlargement (1) along the median line between the navel and the xiphoid process and (2) along a line drawn from the navel to the intersection of the right mid-clavicular line with the costal margin. The mean of these figures (each measured to the nearest centimetre) is recorded as "average palpable liver size".

R. Passmore

HIGGINSON, J., GROBBELAAR, B. G. & WALKER, A. R. P. **Hepatic Fibrosis and Cirrhosis in Man in relation to Malnutrition.** *Amer. J. Path.* 1957, Jan.-Feb., v. 33, No. 1, 29-53, 10 figs. on 4 pls. [50 refs.]

This paper summarizes observations of the liver in 876 consecutive autopsies and 215 biopsies from Bantu patients in Johannesburg. 3 types of lesion were common: (1) a fatty liver found in infancy and usually associated with kwashiorkor, (2) a fine symptomless portal fibrosis, most frequently found in the second half of life and often associated with siderosis, (3) a severe cirrhosis, most frequently of post-necrotic origin and showing no specific age trend.

In discussing aetiology, the authors are very non-committal. They

state that their results provide no evidence that progressive fibrosis develops in the fatty liver of kwashiorkor. Malnutrition may, however, predispose the liver to damage by other noxious agents; viruses, siderosis, toxic drugs and alcohol are possibly causative agents in some patients.

R. Passmore

See also p. 1011, EDINGTON, **Observations on Hepatic Disease in the Gold Coast: with special reference to Cirrhosis.**

GHALIOUNGUI, P., NAGATY, H. F., EL-SHAWARBY, K., RIFAAT, M. A. & SADEK, M. A., with A. M. KASSEM, H. EL-KHASHAB & A. A. NOUR.
A Survey of Goitre and of Parasitic and Nutritional Diseases in Upper Sudan. Reprinted from *J. Egyptian Endocrine Soc.* 1956, v. 2, No. 3, 32 pp., 18 figs. & 2 maps. [20 refs.]

The authors report the results of a series of examinations made by them in Southern Sudan during the period 6th–18th February 1956. The object was to record the incidence of goitre in relation to water supplies and also to record the incidence of parasitic and nutritional disease. Lack of time and funds limited the observations to the 65 pupils and staff of a primary school 20 miles north of Khartoum and to 744 others from 6 locations in the Upper Nile Province between Malakal (9°30'N., 29°35'E.) and Leer (8°20'N.) and Wankai (31°40'E.). The overall incidence of goitre was 49·6%, the incidence varying from 24% to 64% [misprinted as 66% on page 9]. It was also noted that the proportion of large goitres was greater in those areas with increased endemicity. Females were more affected than males. Observations were made on tribal incidence and food habits. There was some correlation between deficiency of iodine in the Nile water and the incidence of goitre, so the authors recommend the use of iodized salt.

In Section 2 the results of examining urine [numbers not given] and single stool specimens from each of 315 people are recorded. No evidence of schistosomiasis was obtained. *Entamoeba histolytica* was found to be affecting 27·3% and *Giardia intestinalis* 15·3%. There was no evidence of ascariasis or ankylostomiasis. It is thought that the dry soil is responsible for the absence of these helminths. Evidence of malaria was found in 21·7% of blood films from 298 people (*P. falciparum* 17%, *P. malariae* 2·6%, *P. vivax* 0·6%). It was considered that splenomegaly gave a better picture of the incidence of malaria but other causes for splenomegaly are not discussed.

In Section 3 the authors state that among 809 cases evidence of pellagra was found in 61% and hepatomegaly in 12·5%. No manifest kwashiorkor was observed. Trachoma was universal.

Frederick J. Wright

SPRUE

MANSON-BAHR, P. **Reflections on the Aetiology of Tropical Sprue.**
(The Present Position.) *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1957, v. 8, Nos. 1/2, 174-81. [10 refs.]

The author gives a brief account of the aetiology, the clinical picture and chemical pathology of tropical sprue and discusses the prevailing disturbances of intestinal function in the light of recent observations and theories, including those concerned with the possible roles of altered intestinal bacterial flora and the ingestion of rancid fats in the pathogenesis and initiation of the syndrome. He points out that, despite these views, the aetiology and pathogenesis of the disease are still obscure, and that there is clearly much research work to be done. He concludes "It would appear probable from the many apparently contradictory facets of this disease that the only rational basis could be some form of infective agent which is possibly present in the diet". This suggestion was first advanced by the author some years ago.

B. G. Maegraith

GIROLAMI, M. **Significato diagnostico delle steatorree.** [Diagnostic Significance of Steatorrhoea] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1957, v. 8, Nos. 1/2, 108-17. German summary.

The author gives a very comprehensive list of the possible aetiological factors in the production of steatorrhoea, including steatorrhoea (a) from excessive ingestion of fat; (b) from changed intestinal preparation of food, as in pancreatic disturbances or lack of bile; (c) from gut short circuits; (d) from changes in absorption, *e.g.*, accelerated intestinal transit, sprue, etc., disturbances of lymph flow, as in mesenteric tuberculosis, carcinoma of the gut, etc. (the author includes hill diarrhoea in this group), and damage to the intestinal wall, *e.g.*, terminal ileitis; (e) from unknown causes. [There is no mention of coeliac disease.]

The importance in diagnosis of careful analysis of faecal fat is stressed.

The Zoia-index $\left(\frac{\text{neutral fat} + \text{fatty acids}}{\text{soaps}} \right)$ is compared from the point of view of differential diagnosis with the ratio fatty acid/neutral fat. The index is raised in failing or deficient lipase and bile secretion, and in other conditions, especially those resulting from various surgical intestinal short circuits and in steatorrhoea arising from altered intestinal absorption (including sprue) or from interference of lymphatic flow.

The determination of the ratio of fatty acid/neutral fat helps to differentiate these conditions. For instance, it is normal or nearly normal when lipase or bile production is reduced. It is considerably raised in absorption defects, including sprue. It is lowered in the presence of short circuits.

B. G. Maegraith

HAEMATOLOGY

NARAYANAN, M. S., SHENOY, K. G. & RAMASARMA, G. B. **Reciprocal Elevation in Serum Levels produced by Injections of Vitamin B₁₂ and Folic Acid in Patients with Nutritional Macrocytic Anemia.** *Indian J. Med. Sci.* 1957, Mar., v. 11, No. 3, 163-74. [27 refs.]

"1. The intramuscular injection of two 100 μ g. doses of vitamin B₁₂ on consecutive days produced a significant rise in the serum folic acid content of patients with nutritional macrocytic anemia, the peak levels being reached usually after 3 to 7 days.

"2. After 6 to 10 days each of these patients was given two daily intramuscular injections of 25 mg. of folic acid, as a result of which the falling or stationary total vitamin B₁₂ level of serum showed a gradual rise, the highest value being attained around the sixth day after folic acid administration; the "free" vitamin B₁₂ level continued to be low and did not show any significant changes.

"3. The results have been discussed in the light of clinical data reported in the literature and it has been suggested that a reciprocal relationship exists between vitamin B₁₂ and folic acid whereby large doses of one tend to mobilize the other from body stores."

PATZ, I. M. **Four Cases of Megaloblastic Anaemia of Pregnancy and the Puerperium.** *South African Med. J.* 1957, Apr. 20, v. 31, No. 16, 384-6. [15 refs.]

"1. Four cases of megaloblastic anaemia of pregnancy and the puerperium occurring in a country hospital over a period of 2 years are described. The diagnosis was confirmed by bone-marrow examinations in all cases.

"2. One case responded to vitamin B₁₂, two cases were treated successfully from the outset with folic acid, and one case failing to respond to B₁₂ responded to folic acid.

"3. In anaemia occurring in the African during pregnancy and the puerperium, megaloblastic anaemia must be kept in mind, irrespective of whether the peripheral blood picture is macrocytic or not.

"4. The difficulties in diagnosis of these cases are discussed; one must not be misled by associated symptoms and signs, such as pyrexia, diarrhoea and abdominal pain."

OLDMEADOW, D. J. **The Relation of Anaemia of Pregnancy in Fiji to Ascorbic Acid Deficiency.** *Med. J. Australia.* 1956, Dec. 1, v. 2, No. 22, 821-4.

In groups of Fijian and Indian women observed under roughly equal climatic and local environments anaemias of pregnancy occurred only in

the Indians. The peak of incidence of anaemia occurred between July and October.

The author has attempted to relate the appearance of the anaemia to the diet of the Indian women.

Since the only obvious seasonal variant in the diet was vitamin C, the ascorbic acid content of the urine of patients was measured soon after admission. Patients were then given 500 mgm. ascorbic acid daily in addition to the ordinary ward diet, and urine estimations were repeated daily until excretion of ascorbic acid occurred (presumably contemporaneous with tissue saturation). 131 Indians (32 with haemoglobin concentrations of less than 9 gm.%) and 96 Fijians (none anaemic) excreted ascorbic acid by the fourth day. 43 Indians and 1 Fijian exhibited delayed excretion; of the former, 32 had low haemoglobin concentrations.

The author points out that the high incidence of anaemia and the vitamin C deficiency were associated in the Indian women. The average vitamin C intake of these women was 40 to 50 mgm. per day, compared with the intake of Fijian women of 300 mgm. to 400 mgm. per day.

In view of the relation between ascorbic acid and the metabolism of iron and folic acid, the author puts forward the following interesting hypothesis:

"The diet of very many Indian patients is either borderline or quite inadequate in both iron and haematopoietic factors, including folic acid, all the year round. This becomes far more serious when extra strain is placed on these resources during pregnancy and lactation. This seasonal deficiency of ascorbic acid can then tip the scales against normal blood formation. . . ."

He points out, however, that clinical scurvy never appeared in his patients, and that treatment by ascorbic acid alone did not reverse megaloblastic to normoblastic marrow. Moreover, spontaneous remissions were not uncommon.

2 types of anaemia were noted: (1) microcytic iron deficiency, responding to adequate iron and sometimes needing folic acid also and (2) macrocytic anaemia, generally hyperchromic, with megaloblasts in the marrow and responding to folic acid. The latter type of anaemia tended to develop quickly. The patients were often febrile. Improvement was rapid after the administration of folic acid. *B. G. Maegraith*

HEUSE, G. A. La drépanocytose. [*Sicklaemia*] *Méd. Trop.* Marseilles. 1956, Nov.-Dec., v. 16, No. 6, 759-85 & 1957, Jan.-Feb., v. 17, No. 1, 28-46, 11 figs. (9 on 7 pls.). [Numerous refs.]

Although a number of good reviews concerning the haemoglobinopathies have appeared in the English, German, Dutch and Indonesian languages, so far no comprehensive account has been given in French. This deficiency has now been made good by the present author. There are several

hundreds of references and in addition to the review an account is given of the author's own studies of the sickle-cell trait in French colonial soldiers of the Marseilles Garrison.

H. Lehmann

ADAMS, J. Q. **Sodium and Potassium Alterations in Red Cells of Patients with Sicklemia.** *J. Lab. & Clin. Med.* 1957, May, v. 49, No. 5, 738-44, 1 fig.

"When sodium and potassium determinations are made in the usual manner on sickled red cells packed by centrifugation, significant alterations are noted. Evidence has been presented indicating that these alterations are not the result of cellular electrolyte shifts but are produced by the increase in intercellular plasma in the nonoxygenated sample. The rigid, elongated sickled cells do not pack as tightly as the normal cells and consequently the packed cells are diluted by various amounts of plasma. This dilution phenomenon is sufficient to explain the electrolyte alterations observed in sickle-cell anemia."

TELLEM, M., RUBENSTONE, A. I. & FRUMIN, A. M. **Renal Failure and other Unusual Manifestations in Sickle-Cell Trait.** *Arch. Pathology.* 1957, May, v. 63, No. 5, 508-12, 6 figs. [13 refs.]

A 35-year-old Negro male suffered precordial pain and dyspnoea; his blood pressure was normal, and blood urea nitrogen 8 mgm.%. 14 months later he died in uraemia with blood urea nitrogen 88 mgm.%, without hypertension and without cardiac enlargement or infarction. His Hb level varied from 14 to 12 gm.%, and his red cell count remained about 4.2 million per cmm. Before death he became jaundiced, and moderate numbers of normoblasts appeared. Radiological changes had been noticed in the ribs, pelvis, and vertebral bodies.

At autopsy all organs showed packing of capillaries with sickled cells, the spleen (80 gm.) showed siderofibrosis, and the kidneys a chronic, minimal, pyelonephritis. The last-named was not sufficient to account for the uraemia, which was attributed to glomerular occlusion by sickled cells; many glomeruli were reduced in size, and showed an exudate into Bowman's capsule as well as dense masses of sickled cells in the tufts.

This case was not established as an example of the sickle-cell trait alone. Indeed the authors admit that it showed several features of sickle-cell anaemia or other pathogenic haemoglobinopathy, though no attempt had been made to formulate a precise diagnosis in life. [Because of this uncertainty the case should not, in the abstracter's opinion, be allowed to add any weight to the view that the uncomplicated sickle-cell trait is responsible for lesions such as those described.]

Alan B. Raper

MOSTOFI, F. K., VORDER BRUEGGE, C. F. & DIGGS, L. W. **Lesions in Kidneys removed from Unilateral Hematuria in Sickle-Cell Disease.** *Arch. Pathology.* 1957, Apr., v. 63, No. 4, 336-51, 11 figs. [10 refs.]

This paper describes the findings in the kidneys from 22 Negro patients with haematuria ranging from days to months, the average being 2 months, whose clinical records and surgical specimens were available in the files of the U.S.A. Armed Forces Institute of Pathology. All had been treated for their severe haematuria by nephrectomy (21) or renal biopsy (1). In all specimens unequivocal sickling was found in the tissue sections and no other cause of haematuria could be discovered. 24 other patients with similar histories were not included in this study: 10 because the red blood cells although abnormal did not show unequivocal sickling, and 14 because in addition to sickle cells other possible contributory causes of haematuria were present. A careful explanation is given of the reliability of the recognition of sickling in fixed and stained sections. The sickling condition is assumed to have been in all cases the sickle-cell trait, because there was nothing in these patients' histories to suggest chronic anaemia, no recurrent attacks of pain and fever had been recorded, no jaundice, no leg ulcers, no enlargement of the heart; the red blood cell counts were normal or only slightly below normal. Other laboratory tests which might have clarified this point completely had unfortunately not been performed, and attempts to obtain further clarification while the specimens were examined were unsuccessful.

Removal of the affected kidney had resulted in a cessation of haematuria in every case, and most patients had returned to military duty or to their usual occupation.

In the specimens no significant gross alterations could be discovered. Four kidneys had been described as normal, one showed "small tan punctate pigmented areas", in another "a thin hemorrhagic zone of injection" had been observed. This "disappointing absence" of major gross pathological changes emphasizes in the opinion of the authors that the lesions are inconspicuous and minute and may easily be missed. On microscopic examination the most characteristic feature in all specimens was the invariable presence of sickled erythrocytes. The most striking change consisted of severe stasis in the peritubular capillaries of cortex and medulla. In cross sections the packed sickled erythrocytes often had the appearance of a collar around the tubules. There was in many cases evidence of older lesions and of subsequent repair. None of the sections showed the fibrin thrombi in the glomerular capillaries which are seen in sickle-cell anaemia, there was therefore no reason to postulate thrombosis as the mechanism underlying the stasis and the haemorrhage.

It was of interest that in 19 of the 22 patients the left kidney had been involved, and only in 3 the right. The authors suggest that this might be due to a more pronounced stasis because on the left side the upper pole of the kidney is drained by a vein passing under the left renal

artery. The medulla and the papilli were more frequently involved, and no obvious explanation for this predilection could be found.

Haematuria is an accepted complication in sickle-cell anaemia (the homozygous condition), and radical treatment is almost never applied. Haematuria in sickle-cell trait carriers, most of whom are otherwise free from symptoms, is such an alarming initial manifestation that surgical intervention is more frequent, but according to the authors it is hardly justified. They recommend that it may be advisable to avoid nephrectomy in healthy young Negroes if haematuria has no other obvious cause than sickling of the red cells.

H. Lehmann

DENNY, W. F., FINN, T. O. & BIRD, R. M. **Clinical Diagnosis of Sickle-C Disease.** *Arch. Intern. Med.* 1957, Feb., v. 99, No. 2, 214-17, 1 fig.

The aim of this communication is to point out the clinical differences between sickle-cell anaemia and sickle-cell-haemoglobin-C disease. In 5 cases of "Sickle-C disease", details of which are presented, the principal characteristics were splenomegaly, the presence of numerous target cells, and complications typical of sickle-cell anaemia, although in most instances there was no significant degree of anaemia present. The complications included arthralgia, abdominal cramps, ulceration of the skin, bony changes and optic atrophy. It is emphasized that the presence of a high proportion of target cells in patients with sickle-cell-haemoglobin-C disease was very helpful in differentiating it from sickle-cell anaemia. A further point brought out is that in patients with sickle-cell-haemoglobin-C disease the spleen is almost constantly enlarged, whereas it is seldom enlarged in sickle-cell anaemia. [It should be recognized that in children with sickle-cell anaemia splenomegaly is usual and that only on survival into later life is the spleen likely to shrink and become impalpable. It is also important to bear in mind that the presence of large numbers of target cells may characterize other haemoglobinopathies, particularly thalassaemia and its genetic variants.] A. W. Woodruff

BIRD, G. W. G. & LEHMANN, H. **Haemoglobin D in India.** [Correspondence.] *Brit. Med. J.* 1956, Mar. 3, 514.

Following the discovery of the haemoglobin D trait in 1 out of 109 Sikhs [Bird *et al.*, this *Bulletin*, 1955, v. 52, 1227] the present authors examined a further 62 unrelated Sikhs and found another example of haemoglobin D. This time it was present without any other haemoglobin, and the authors concluded that they had encountered the phenotype DD for the first time. The affected subject showed a microcytic polycythaemia, increased osmotic resistance of the erythrocytes, and numerous target cells. These findings were almost identical with those in subjects possessing only haemoglobin

E, and indeed both of these conditions would have been confused with thalassaemia minor if it had not been for the haemoglobin analysis. Since thalassaemia has been repeatedly reported from India, where haemoglobin D is now known to occur, the authors suggest a re-examination of thalassaemic families there for abnormal haemoglobins.

[Conversely, it may be noted that there is increasing support for the view, first given practical demonstration by EDINGTON and LEHMANN (*Brit. Med. J.*, 1955, Nov. 26, 1328), that the finding of only one haemoglobin variant in a person's blood does not necessarily imply homozygosity for the gene determining its presence; and this possibility must especially be entertained if the apparent homozygotes occur with more than their expected frequency, and if there is a possibility of the simultaneous presence of the thalassaemia gene.] *Alan B. Raper*

LEHMANN, H., STORY, P. & THEIN, H. **Haemoglobin E in Burmese. Two Cases of Haemoglobin E Disease.** *Brit. Med. J.* 1956, Mar. 10, 544-7, 5 figs. [17 refs.]

The authors examined 80 young adult Burmese living in England, and found 10 with haemoglobins A and E, and 2 with haemoglobin E only. These 2 were studied further; they were fit young men, living active lives, without physical signs of disease. Haematological findings in each case are given in detail. Each showed polycythaemia, microcytosis and leptocytosis, and decreased saline fragility of the red cells. Only one of the subjects had a mild degree of anaemia (Hb 13.6 gm./100 ml.) and a slight increase in serum bilirubin (1.2 mgm./100 ml.). This man's haemoglobin contained 2.1 to 2.5% of an alkali-resistant fraction. On paper electrophoresis at pH values 8.6, 7.0, 6.8 and 6.5, the haemoglobin of each subject showed mobilities characteristic of haemoglobin E only.

The authors consider the risk of deducing, from electrophoretic evidence alone, that a subject is homozygous for an abnormal haemoglobin gene. In the present case, an alternative hypothesis was that the subjects were double heterozygotes for haemoglobin E and thalassaemia. The available evidence, however [especially that of CHERNOFF *et al.*, this *Bulletin*, 1956, v. 53, 1046], indicated that double inheritance of thalassaemia and the haemoglobin E gene led to a severe anaemia accompanied by a considerable rise of alkali-resistant haemoglobin; whereas in "haemoglobin E disease" there was only a mild anaemia. The present cases are therefore added to, and amplify, existing descriptions of the latter condition.

A brief summary is given of reported observations of haemoglobin E carriers, and this variant of haemoglobin is surmised to have implications in anthropology, pathology, and population genetics in South-East Asia similar to those of haemoglobin S in Africa. *Alan B. Raper*

VENOMS AND ANTIVENENES

BUCKLEY, E. E. & PORGES, N. **Venoms. Papers presented at the First International Conference on Venoms December 27-30, 1954, at the Annual Meeting of the American Association for the Advancement of Science.**

This book was reviewed on p. 898.

MELLO LEITÃO, A. Acidentes causados por animais peçonhentos. [Accidents Caused by Venomous Animals] *Arquivos Brasileiros Med.* 1956. Sept.-Oct. & Nov.-Dec., v. 46, Nos. 9/10 & 11/12, 361-82; 441-66, 13 figs. [13 refs.]

A full account and discussion.

GUJRAL, M. L. & DHAWAN, B. N. **The Effect of Drugs modifying Absorption on Death caused by Cobra Venom in Rats.** *Indian J. Med. Res.* 1956, Oct., v. 44, No. 4, 625-9.

Members of groups of 10 albino rats were injected with Haffkine Institute cobra venom 0.25 gm. per 100 gm. body weight, half an hour after a dose of the drug under test. Half an hour later a second dose of drug was administered.

The controls, given venom only, all died within 72 minutes. Survival times of the experimental animals were noted.

Drugs examined were cortisone, corticotrophin, hyaluronidase, rutin, adrenaline, calcium chloride, sodium salicylate and Synopen. Reduction in survival rate was observed with hyaluronidase. Prolongation of some degree occurred with calcium chloride. Some animals injected with corticotrophin, cortisone and rutin survived.

Clinical trials are suggested for the last three drugs and calcium chloride.

B. G. Macgregair

CARO, M. R., DERBES, V. J. & JUNG, R. **Skin Responses to the Sting of the Imported Fire Ant (*Solenopsis saevissima*).** *Arch. Dermat.* 1957, Apr., v. 75, No. 4, 475-88, 7 figs. [14 refs.]

The authors briefly describe the ant, *Solenopsis saevissima*, which was recently imported into the United States, and its habits. The clinical effects of stinging were studied in volunteers who allowed themselves to be stung. The method of stinging was observed. The ant pinches up the skin with the mandibles and then inserts the stinger, which is left in

position for 20-25 seconds, then withdrawn and often reinserted in a neighbouring area. Multiple stings are characteristic.

An immediate prominent flare appears round the bite. After a minute a growing weal develops and lasts for about an hour. One to two hours later vesicles of clear fluid appear at the site of the sting; some hours after that the fluid becomes cloudy. After 24 hours the sting sites present an umbilicated pustule surrounded by an erythematous halo or painful oedema. After 3-10 days the pustule ruptures with crust formation. Subsequently there is scar formation, fibrotic nodules, and occasionally eczematoid dermatitis.

Biopsy specimens of skin in the region of the sting were removed at 6 minutes, 30 minutes, 24 hours and 72 hours. Some oedema of the upper corium and some mantling of blood vessels with lymphocytes were noted at 6 minutes. At 30 minutes the epidermis was oedematous, superficial blood vessels were dilated and there were scattered masses of necrosis in the corium. At 24 hours there was a superficial, distinctly demarcated pustule. At 72 hours the pustule was still intact. The floor was oedematous epidermis except in the centre, where "the cellular infiltrate broke through" into the underlying necrotic connective tissue. With one exception pustules were bacteriologically sterile.

The consistent formation of a pustule is an unusual feature which differentiates this ant-sting from those of most other insects.

Multiple bites may lead to severe allergic general reactions which may even be fatal. Case histories are given.

Topical application of Fludrocortisone, of an antibiotic ointment (Neosporin) or of antihistaminics had no effect. *B. G. Maegraith*

TOXOPLASMOSIS

BIAGI F., F. & ALEMAÑY, J. Intradermo-reacciones con toxoplasmina en Ixtapalapa, D.F., México. [**Intradermal Reactions with Toxoplasmin in Ixtapalapa, D.F.**] *Bol. Med. Hosp. Infantil. Mexico*. 1957, v. 14, No. 2, 125-8. [12 refs.]

The English summary appended to the paper is as follows:—

"Two hundred and seventy two intradermal reactions were practised in 2 small suburbs in Mexico D.F., having found 13.6% positive reactions.

"It was found that an antigen prepared 6 years before was still active.

"It is believed that primary infections due to *Toxoplasma gondii* among this population occur chiefly during the first five years of life."

DELASCIO, D. Toxoplasmose congênita. Aspectos clínicos, obstétricos e experimentais. [**Congenital Toxoplasmosis. Clinical, Obstetric and Experimental Aspects**] *Maternidade e Infância*. S. Paulo. 1956, July-Sept., v. 15, No. 3, 179-532, numerous figs. [Numerous refs.] English summary.

This fine monograph on toxoplasmosis comes from the State of São Paulo of Brazil where the causative organism was discovered by SPLENDORE nearly 50 years ago. It provides a wide survey of the literature and gives an account of the author's own investigations on 12 congenital cases of the disease, experiments with pregnant guineapigs and epidemiological observations.

Toxoplasma gondii can invade any tissue or organ but it has a special affinity for the embryonic nervous system. Thus the major congenital lesions are changes in the volume of the skull, chorio-retinitis, mental deficiency and intracranial calcifications. Microcephaly was more frequent in the author's cases than hydrocephaly: half the cases showed this feature, while in 32 children with hydrocephalus only one was shown to have toxoplasmosis. All his congenital cases had chorio-retinitis, and many had other ocular lesions. Half of a series of children with chorio-retinitis were proved to be infected with the organism. Mental deficiency was present in 8 out of the 12 patients, while 3 showed calcifications, and 3 showed major changes in the cerebrospinal fluid. The dye test was positive (in a dilution of 1 in 256 or above) in 11 of the 12 patients and in the mothers; the complement-fixation reaction occurred at titres of between 1 in 2 and 1 in 128.

[Good photographs, including some in colour, illustrate the 12 congenital cases, the majority of which occurred in São Paulo itself.]

The isolation of the organism is the surest way to identify the disease, but very often this is impossible.

Subclinical toxoplasmosis was found in 6 of 50 pregnant women, as shown by positive serological reactions, but none of the offspring exhibited signs of the disease. Women with a history of previous abortions of unknown origin were investigated and 2 out of 16 gave positive serological reactions; 8 cases of hydatidiform mole were negative. 4 mothers of children with congenital toxoplasmosis were followed up in later pregnancies: all gave birth to normal children.

Some interesting observations were made on the effect of inoculating *Toxoplasma* suspensions to pregnant guineapigs *per vaginam* (8-20 days before term). The lesions in the placenta were studied and the incidence of the infection in the progeny of the animals. The mothers all became infected after 7 days. The offspring were usually infected, in the spleen and liver at first but solely in the brain after some months. Guineapigs with chronic infections did not transmit the disease to their offspring.

Finally there are given useful practical points on the prophylaxis and prognosis of toxoplasmosis in pregnancy.

P. C. C. Garnham

STILLERMAN, M. **Mild Neonatal Toxoplasmosis. Case Report with a Four-Year Serologic and Dermal Sensitivity Study.** *J. Dis. Children.* Chicago. 1957, May, v. 93, No. 5, 563-7, 1 fig.

"A relatively mild acute encephalitis due to congenital toxoplasmosis is presented in a newborn infant manifesting fever and slightly increased spinal-fluid protein. An unusual vesicular-crusted rash was present from the 5th to 23d day of illness. The classical clinical signs of the disease were absent. The tentative diagnosis which was made in the neonatal period by serologic tests, was confirmed subsequently by a progressive rise and fall of Toxoplasma dye test and complement fixing antibodies in the sera of the patient and mother over a four-year period. Demonstrable antibody disappeared from the child's serum three years after the onset of his illness. Toxoplasmic skin tests made when the child was 4 years old evoked no reaction in the child but did produce a dermal sensitivity reaction in the mother whose serum still contained antibody. The physical and mental development of the child is normal up to the present age of 5 years. Early treatment with sulfadiazine and convalescent Toxoplasma serum may have been of value."

HAFSTRÖM, T. Encephalopathia toxoplasmotica. [**Toxoplasmal Encephalopathy**] *Opuscula Med.* Stockholm. 1957, Apr., v. 2, No. 4, 103-7.

The English summary appended to the paper is as follows:—

"Among 15 cases of toxoplasmosis treated at the medical outpatient department of Södersjukhuset four patients showed clinical signs of meningoencephalitis. These cases are presented. Neurologic symptoms consisted of headache, vertigo, anxiety, vibration feeling, warmth and paraesthesias. These symptoms may appear as late as 6-8 months after the acute stage of the disease. The clinical picture is considered to represent an encephalopathia toxoplasmotica."

BEVERLEY, J. K. A. **Toxoplasmosis.** Reprinted from *Vet. Record.* 1957, Mar. 16, v. 69, 337 (6 pp.), 3 figs. on pl. [38 refs.]

This paper contains a useful summary of the general incidence of toxoplasmosis in animals, and gives in some detail the course of the disease in domestic animals. 60 cases have been described in dogs, in which the usual symptoms are fever and diarrhoea (from ulceration of the gut mucosa), sometimes accompanied by nervous manifestations and in half the cases by respiratory signs (necrotic nodules are common in the lungs).

Probably most cases of canine toxoplasmosis are subclinical, because the disease is difficult to produce experimentally, even after the intravenous administration of 30 million organisms; stress factors like cold, captivity, and pregnancy may increase the susceptibility of the animal.

Cats are much less frequently affected, while the active disease appears to be absent in rats. Epizootics are not uncommon in rabbits, and the organism can easily be recovered from the brains of wild rabbits, often in a non-virulent form (the virulence can be enhanced by using mice that have been treated for a week beforehand with cortisone and continuing the administration of this substance). Clinical toxoplasmosis occurs in widespread areas in hares particularly in the winter. Apart from pigeons and other wild birds, the infection occurs in a severe form in fowls. An outbreak of toxoplasmosis has occurred in calves, with respiratory symptoms and finally death. Swine usually show a negligible reaction to the infection, but epizootics have been reported in the United States.

It is pointed out that hydrochloric acid in concentrations equivalent to those in the gastric juice will kill free toxoplasms in 15 minutes [this *Bulletin*, 1957, v. 54, 610], but organisms inside tissues are protected and can easily infect when taken up in this way, as in meat or carcasses; human beings are more likely to become infected from pseudocysts by the respiratory route.

P. C. C. Garnham

MORERA, P. & BARBARESCHI, G. Contribución al estudio de la toxoplasmosis experimental. [**Experimental Toxoplasmosis**] *Rev. Biología Trop.* San José, Costa Rica. 1956, Dec., v. 4, No. 2, 103-49, 48 figs. on 12 pls. [10 refs.]

The English summary appended to the paper is as follows:—

“A study is presented of lesions caused on laboratory animals by the Costa Rican strain of *Toxoplasma gondii* known as ‘La Esperanza’ after the area where it was found, and which is kept alive in mice. Lots of four white mice, white rats, and guinea pigs were used, from stocks raised in the laboratory for several generations to insure their health.

“Each mouse was given an inoculation of 100,000 parasites; each rat, 200,000, and each guineapig 300,000. Some of the inoculated animals died from the infection, the rest were killed in a gas chamber. In all cases autopsies were made and organs (kidney, spleen, liver, lung, heart and brain) were fixed in 10% formalin and embedded in paraffin.

“Sections were stained with the usual hematoxylin-eosin combination, with Laidlaw’s silver carbonate, and Gallego’s triple stain.

“White mice were found to be highly susceptible to toxoplasmosis. Individuals died regularly in six days, a fact already noted in keeping the strain alive. Two of the guinea pigs died at the same time and two were killed later. Rats showed more resistance, and all were killed after some time.

“Histological examination showed animals to be divided in two groups according to the lesions found. Acute cases showed parenchymatic pathological phenomena, and predominantly exudative reaction in mesenchymo-vascular structures. In subacute or chronic cases parenchymatoses

were also present, but reticulo-endothelial proliferative reaction prevailed over the exudative.

"Pseudocysts were found in the lumen of renal tubules, a fact considered of much importance, as it would establish the infectivity of urine. Another important finding was the presence of an argyrophilic pseudocyst membrane, confirming other authors' opinions."

DERMATOLOGY AND FUNGUS DISEASES

BARNES, H. D., FROOTKO, J. & PARNELL, J. L. **Unusually Early Manifestations of Porphyria Cutanea Tarda.** *South African Med. J.* 1957, Apr. 6, v. 31, No. 14, 342-4, 4 figs. [10 refs.]

D'AVANZO, G. Raro caso clinico cronicizzato di dermatite da contatto provocata da farfalle del genere *Hylesia*. [**Yellowtail Moth Dermatitis—or—Caripito Itch**] *Med. d. Lavoro.* 1957, Feb., v. 48, No. 2, 101-11, 6 figs.

The English summary appended to the paper is as follows:—

"The author, a Ship's Surgeon of the Italian Merchant Marine, describes a rare case of chronic dermatitis caused by *Hylesia* moths, which was treated and healed by desensitizing with increasing doses of the same poison contained in the moths' hair."

[See this *Bulletin*, 1953, v. 50, 557.]

See also p. 1023, ANGELILLO *et al.* Su un episodio di infestione cutanea da larve di trombiculidi nell'uomo. [**Cutaneous Infection from Trombicula Larvae in Man**]

TROPICAL OPHTHALMOLOGY

BUDDEN, F. H. **Natural History of Onchocerciasis.** *Brit. J. Ophthalm.* 1957, Apr., v. 41, No. 4, 214-27. [16 refs.]

This is a long and valuable contribution to our slender knowledge of this interesting disease.

The author describes an investigation in which he studied the changes occurring in the eyes of a village community in Northern Nigeria exposed to heavy endemic onchocerciasis over a period of 43 months.

Although visual deterioration was common, spontaneous improvement in ocular lesions and visual acuity occurred in a small proportion of persons without treatment. The author related the ocular changes to the concentration and distribution of microfilariae in the body. Three stages in the progress of human infection with onchocerciasis which have been observed in Nigeria are described, and the ocular lesions liable to occur at each stage are noted.

Stage 1 consists of light infection, localized to one region of the body. Eye lesions are uncommon and are confined to the anterior segment. They do not interfere with vision.

The second stage is that of generalized infection often with heavy involvement of the anterior segment of the eye, and choroido-retinal degeneration may be seen in long-standing infections of this type.

The third stage is that of regression occurring in the absence of treatment. Previous ocular signs may gradually lessen, with some improvement in visual acuity.

The distribution of these stages among persons in areas of heavy, moderate and light endemicity and among those exposed only to occasional infection is discussed and tabulated.

In addition to these three stages in which microfilariae are found, there is an incubation period lasting about 15-18 months before microfilariae are demonstrable in the skin or eye. Moreover, a late stage of burnt-out infection sometimes occurs in elderly persons in whom typical dermal and sometimes ocular lesions are present, but in whom microfilariae are not found.

Finally, the author discusses the prognosis of ocular onchocerciasis and its application to therapy in relation to the stage and intensity of infection.

This paper is lengthy and contains much information valuable not only to ophthalmologists but to any worker in contact with this difficult and obscure subject.

D. P. Choyce

HEAT STROKE AND ALLIED CONDITIONS

GROBER, J. Die Schwülekrankheiten. [Heat Diseases] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1957, v. 8, Nos. 1/2, 122-33, 2 figs.

The limits of successful existence in hot climates are to some extent determined by racial and individual reactions and by the development or otherwise of acclimatization. The Lancaster-Castens curve is discussed in this context. Factors of importance include air temperature, moisture and movement, atmospheric ionization and radiations, such as the infrared. The significance of these factors, in so far as the appearance of

clinical heat failures is concerned, is discussed in regard to industry, navigation, mining, etc. The pathogenesis and clinical features of heat effects are also briefly discussed.

B. G. Maeraith

MISCELLANEOUS DISEASES

MANSON-BAHR, P. **Tropical Medicine.** *Med. Illustrated.* 1956, May, v. 10, No. 5, 334-6.

_____. **Tropical Diseases.** *Brit. J. Clin. Practice* (incorporating *Med. Illustrated*). 1957, May, v. 11, No. 5, 378-83. [23 refs.]

These two papers summarize some of the more important advances in tropical medicine made in recent years. The first begins with references to the recognition of strains within the species of malaria parasites and goes on to refer to the discovery of the exo-erythrocytic cycle in the plasmodia of human malaria.

A short account is given of the newer antimalarial drugs, the question of drug resistance, the use of new insecticides and some of the results achieved with them.

The more general recognition of the incidence of kala azar is illustrated, with special reference to the recent outbreak in Kenya [this *Bulletin*, 1955, v. 52, 520]. There is a note on the spread of yellow fever in Central America [*ibid.*, 1957, v. 54, 417]. The paper ends with a short reference to the discovery of *Echinococcus multilocularis*, the alveolar echinococcus of Central Europe [*ibid.*, 1955, v. 52, 1208].

The second paper opens with an account of tropical eosinophilia and its treatment and refers especially to the use of diethylcarbamazine in this connexion [*ibid.*, 1957, v. 54, 490]. There is also short discussion of Chagas's disease and special mention is made of the increasing recognition of the incidence and seriousness of its cardiac complications, especially in Brazil. The author also refers to the newly-described syndrome in Chagas's disease known as *mal de engasgo* [*ibid.*, 1957, v. 54, 147]. A large part of this paper is devoted to references to the haemoglobinoses, especially those associated with haemoglobins S and E. There is some account of siderosis in Africans.

The paper ends with observations on the zoonoses and the example of leishmaniasis is given. The epidemiological features of this group and the different geographical forms are outlined, with emphasis on the natural history of the various forms. Special mention is made of the moist and dry types of cutaneous leishmaniasis described by Russian workers [*ibid.*, 1954, v. 51, 37].

H. J. O'D. Burke-Gaffney

HELMAN, J. **Some Diseases amongst the Hottentots of South West Africa.** *Central African J. of Med.* 1957, Apr., v. 3, No. 4, 143-4.

The author records some observations on 6½ years of clinical work among the Hottentots living in the southern portion of South-West Africa in an arid region without contact with the sea. The diet consists largely of various bulbs, melons, honey and gum acacia supplemented by maize, goat's meat and milk and locusts as a delicacy. Deficiency diseases, including kwashiorkor, are seen after droughts. Dental decay is almost unknown, the fluorine content of the water being high. Endemic diseases include syphilis, gonorrhoea, brucellosis and hydatid cysts. Cardiovascular syphilis is observed but tabes dorsalis and general paresis are rare. A condition of hypersuggestibility resembling latah is common.

No case of primary carcinoma of the liver was seen but common tumours were epithelioma of the penis attributable to the scarcity of water and consequent lack of cleansing in the uncircumcised and, in women, epithelioma of the mouth associated with the use of hot metal pipes for smoking. The males use pipes with an ebony stem and are not affected appreciably.

The author found a chronic bullous eruption of the hands, provoked by trauma, to occur. The bullae end abruptly at the wrists. Scabies norvegicus is also common.

Onyalai with typical lesions was observed in the older persons and affected both sexes equally. [This incidence is of interest in that it differs from that found by GELFAND (this *Bulletin*, 1954, v. 51, 1299).] The author found bleeding ceased when 20 ml. of the patient's own blood was given intramuscularly.

Louse-borne typhus was observed by the author during 1934-35 and seemed to occur in both a mild and a severe form. Lice were found in abundance on the sack cloths which form the walls of a Hottentot hut. The Weil-Felix reaction was said to be diagnostic but details are not given. [Could the mild cases have been flea-borne?]

[Reports from isolated areas such as this are of considerable value as the similarities and differences with other areas may throw light on the aetiology of such conditions as carcinoma of the liver and onyalai.]

Frederick J. Wright

HUGON, J. La fonction hépatique de l'indigène du Kwango. I.—Résultats de 200 ponctions-biopsies du foie. [**Liver Function in Africans in Kwango. I. Results of 200 Liver Biopsies**] *Ann. Soc. Belge de Méd. Trop.* 1956, Dec. 31, v. 36, No. 6, 827-37. [30 refs.]

Liver biopsies were performed, with Silverman's needle or Eteve's modification, on 200 patients (children and adults) in hospital at Kwango, Belgian Congo. The findings are given in the following table:

Normal livers	78
Cytolytic hepatitis	16
Primary carcinoma	6
Fatty degeneration	14
Liver abscess	1
Fibrosis	63
All types of cirrhosis	14
Leprous follicle	1
Isolated malaria pigment	4
Schistosomal granuloma	1
Caseous tubercle	2

The author discusses the results of his survey at length and concludes that the lesions observed, especially the frequent fibrotic changes, are similar to those described by other authors in Africa [this *Bulletin*, 1952, v. 49, 552, 714 *bis*; 1953, v. 50, 58 *bis*; 1954, v. 51, 972; 1955, v. 52, 395, 496].

B. G. Maegraith

EDINGTON, G. M. **Observations on Hepatic Disease in the Gold Coast: with special reference to Cirrhosis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Jan., v. 51, No. 1, 48-55, 2 figs. on 2 pls. [12 refs.]

This paper summarizes the pathology of the liver found in 552 consecutive necropsies. In 87 there was portal tract fibrosis, in 38 cirrhosis and in 7 carcinoma. Focal changes were found in 73, central changes in 24 and massive necrosis in 15 livers. This represents undoubtedly a high incidence of liver disease, and so confirms the findings of other observers in the Gold Coast. By contrast the incidence of cholecystitis and gall stones is low.

In discussion it is pointed out that nutritional deficiency, infective hepatitis, toxic substances, including alcohol, haemosiderosis, malaria and other specific infections may contribute to the aetiology of cirrhosis and other liver diseases. The author is unable to estimate the relative importance of these factors, but suggests that malnutrition may not be as important in the production of cirrhosis as it is presumed to be elsewhere in the tropics.

R. Passmore

EDINGTON, G. M. **Malignant Disease in the Gold Coast.** *Brit. J. Cancer.* 1956, Dec., v. 10, No. 4, 595-608. [17 refs.]

The author analyses the findings in the Gold Coast (Ghana) at autopsies during the years 1923-55 and the records of biopsy specimens received in the Medical Research Institute, Accra, for the years 1942-55. The material indicates that carcinoma is common and that the most common types met with are squamous celled carcinoma of the skin, primary liver celled carcinoma, carcinoma of the uterus and breast and, fifth in incidence, carcinoma of the stomach. Tumours of the haemopoietic tissues and malignant melanoma are also common.

Primary carcinoma of the liver was in association with cirrhosis in 34 instances and without accompanying cirrhosis in only 1 instance. Unlike kwashiorkor, which shows an equal sex incidence, primary carcinoma of the liver was recorded among malignant disease at autopsies in 53 out of 98 males (54%) and 7 out of 23 females (30%), and from biopsies in 14 out of 169 males (8%) and 2 out of 211 females (1%).

30 cancers of the bladder (20 in males, 2 in females and 8 unspecified) were recorded. Ova of *Schistosoma* were found in 30% of the biopsy and 71% of the autopsy material but the infection rate was undoubtedly higher. It is suggested that the difference in sex incidence may be evidence against schistosomiasis being a factor in the production of cancer of the bladder.

Carcinoma was found in 13 out of 83 specimens of thyroid tissue submitted for histological diagnosis. It is known that endemic goitre is common in areas in the Northern Territories of Ghana and the probability that thyroid carcinoma is common also poses a fruitful problem for research. Cancer of the lung was rarely found, only 4 cases occurring among 4,395 autopsies. Pipe smoking is as yet more popular than cigarettes.

Comparison with reports from Nigeria, Uganda and French West Africa shows a remarkable similarity in the incidence of nearly all types of malignant disease [this *Bulletin*, 1948, v. 45, 650; 1955, v. 52, 207, 408].

[This is a valuable contribution. The lack of correlation between the incidence of primary carcinoma of the liver and kwashiorkor noted in relation to sex incidence agrees with the abstractor's experience in Kenya where the patchy distribution of kwashiorkor (probably conforming to post-weaning feeding habits) was not paralleled by the more general occurrence of hepatoma. With regard to cancer of the bladder the increased susceptibility of the male might be related to the increased morbidity caused by *S. haematobium* in males compared with females (probably due to associated partial urethral occlusion). To substantiate that vesical schistosomiasis does not predispose to cancer a similar incidence in affected and unaffected areas must be demonstrated.]

Frederick J. Wright

HIGGINSON, J. **Primary Carcinoma of the Liver in Africa.** *Brit. J. Cancer.* 1956, Dec., v. 10, No. 4, 609-22, 11 figs. on 3 pls. [37 refs.]

There is general agreement that there is a high incidence of primary carcinoma of the liver in the indigenous races of Africa [this *Bulletin*, 1951, v. 48, 83].

This paper reports studies made on 53 primary carcinomas of the liver observed at necropsy at Baragwanath Hospital, Johannesburg. Biopsies

were available in 15 of these cases and in a further 36. The distribution of 88 cases according to cell type was as follows:

<i>Cell type</i>		<i>Male</i>		<i>Female</i>		<i>Total</i>
Hepatocellular	(a)	44	} 73	3	} 7	80
	(b)	29		4		
Cholangiocellular	(a)	1	} 2	2	} 2	4
	(b)	1		0		
Unclassified	(a)	2	} 4	0	} 0	4
	(b)	2		0		
		79		9		88

(a) Tumours examined at post mortem

(b) Tumours examined by liver biopsy

and the following table compares the incidence with the number to be expected in the United States:

<i>Cell type</i>	<i>Males</i>		<i>Females</i>	
	<i>Number observed in S.A. Bantu</i>	<i>Number expected U.S. White</i>	<i>Number observed in S.A. Bantu</i>	<i>Number expected U.S. White</i>
Total	30	2.9	10	2.0
Hepatocellular	27.7	2.6	7.7	1.1
Cholangiocellular	0.8	0.3	2.2	0.9
Unclassified	1.6	—	—	—

The hepatocellular form is more frequently associated with cirrhosis than the cholangiocellular type and appears to have a different aetiology so that the histological distinction is of fundamental significance.

The author describes the histological appearances in detail. He noted a reduction in mitochondria in many tumour cells, although not in all, but the remaining mitochondria were often coarser and more spherical than normal. Mitoses are easily demonstrated in malignant liver tissue although the author had found them to be almost completely absent in 69 out of 70 cirrhotic livers from consecutive post mortems. The author considers the relationship of direct and indirect division in liver cell multiplication to carcinogenesis is worthy of investigation.

The relation of hepatocellular carcinoma to associated cirrhosis is set out in the following table:

<i>Liver lesion</i>	<i>Males</i>		<i>Females</i>	
	<i>Livers</i>	<i>With cancer</i>	<i>Livers</i>	<i>With cancer</i>
Non-fibrotic	271	0 (0.0%)	260	0 (0.0%)
Slight fibrosis	142	1 (0.7%)	55	2 (3.6%)
Moderate fibrosis	50	0 (0.0%)	17	0 (0.0%)
Severe fibrosis (fine cirrhosis)	10	1 (10%)	5	0 (0.0%)
Severe fibrosis with hyperplasia	39	21 (54%)	9	0 (0.0%)
Total	512	23	346	2

Nodular hyperplastic cirrhosis suggesting a post-necrotic or post-hepatic origin occurred in 37 of 47 hepatocellular carcinomas. There is clinical and some pathological evidence that in Bantus the preceding cirrhosis is present for a relatively short time compared with comparable cases in

white races. In 7 cases the hepatocellular carcinoma arose in "non-cirrhotic livers" but 6 of these showed some irregular fibrosis and inflammation of the portal triads with new bile-duct formation.

It is suggested that the liver in the African is frequently damaged in childhood rendering it more susceptible to a carcinogenic stimulus. There is no satisfactory evidence that in the South African Bantu post-necrotic cirrhosis is the result of kwashiorkor or any other specific dietary deficiency. Prevention should be possible by eliminating abnormalities in hepatic metabolism in infancy or by avoidance of the carcinogenic stimuli causing post-necrotic cirrhosis in later life.

[An accurate analysis.]

Frederick J. Wright

CHUNG, Hsüeh-Li & CH'EN, Hao-Chu. **Primary Carcinoma of Liver.**

A Clinical Analysis of 107 Cases. *Chinese Med. J. Peking.* 1957, Apr., v. 75, No. 4, 295-315, 4 figs. on pl. [38 refs.]

KREIS, B. Eosinophilie tropicale à forme asthmatique. [**Asthmatic Form of Tropical Eosinophilia**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1957, Nos. 11, 12 & 13, 375-80.

BRYGOO, E. R. Étude sur la position du bacille de Whitmore dans la systématique. [**Study of the Systematic Position of Whitmore's Bacillus**] *Ann. Inst. Pasteur.* 1957, May, v. 92, No. 5, 688-92. [20 refs.]

Whitmore's bacillus is easily identified but less readily classified. Brygoo considers the arguments that have been brought forward to classify it with the glanders bacillus and others that relate it to the blue pus organism. He agrees with Prévot that motile and non-motile organisms should not be in the same genus, and he would, therefore, exclude Whitmore's bacillus from the genus containing the glanders organism. The polar flagellation of Whitmore's bacillus suggests that it should be regarded as a pseudomonad, but the absence of diffusible pigment should exclude it from *Pseudomonas*. Its yellow pigment suggests affinities to *Xanthomonas*, but as all the species of that genus are plant pathogens Brygoo hesitates to suggest the inclusion of the human pathogen in that genus.

His proposals are (1) that the glanders bacillus should remain in the family Parvobacteriaceae, in the genus *Malleomyces* [he does not discuss the difficulties of accepting that name]; (2) that Whitmore's bacillus should be included in the family Pseudomadaceae in a new genus *Whitmorella*, with *Whitmorella pseudomallei* as the type species.

S. T. Cowan

PARASITOLOGY: GENERAL

HOEPLI, R. **Ancient Views regarding Parasitic Infections held by the Indigenous Population of Fiji and Tahiti.** *Proc. Alumni Ass., Malaya.* 1957, Mar., v. 10, No. 1, 3-13. [18 refs.]

See also p. 994, GHALIOUNGUI *et al.*, **A Survey of Goitre and of Parasitic and Nutritional Diseases in Upper Sudan.**

DESCHIEENS, R. Les incidences nosologiques des engagements de parasites d'animaux chez l'homme. [**Conditions Resulting from Invasion of the Human Host by Parasites usually associated with Animals**] *Bull. Acad. Nat. Méd.* 1957, v. 141, Nos. 5/6, 114-19. [18 refs.]

Certain helminths and arthropods, which usually parasitize mammals other than man, may invade the human host and, although unable to complete their normal further development, may remain alive and active for various periods of time, after which they die or, less commonly, make their escape. Deschiens summarizes our knowledge of some of the creatures which may live in this biological environment of *impasse parasitaire*, and describes the humoral and tissue changes associated with their presence.

In the discussion which followed the reading of the paper, comment was made on the eosinophilia commonly associated with *larva migrans*.

R. M. Gordon

RIBEIRO, H. de P. Anemia e parasitoses intestinais. [**Anaemia and Intestinal Parasitosis**] *Rev. Brasileira Med.* Rio de Janeiro. 1957, Jan., v. 14, No. 1, 14-16. [10 refs.]

The English summary appended to the paper is as follows:—

“The author makes a statistical study of intestinal parasitosis verified in 1,034 patients admitted for the first time and readmitted during the period of 1950, and 1954, June, to the Women's Ward under the charge of Dr. Manoel Lage, to whom he is Assistant. Though this is a work relative to verminosis, special attention is called upon ankylostomiasis, with a percentage of 45%. In this classification ascariasis ranks second with 35%, trichocephalosis with 21%, strongyloidosis with 6%, amebiasis with 5%, teniasis with 0.7%, giardiasis with 0.5% and oxyuriasis with 0.3%. These figures were obtained after direct stool examination. Blood counts were made to stress its contribution in the study of verminosis in a great number of patients. Some patients have been submitted to the study of the curve of gastric acidity and the determination of the proteolytic power. The author follows the Brazilian school of Walter Oswaldo Cruz and stresses the importance of diet and the iron

therapeutics in the treatment of hypochromic anemia, specially that caused by *Ankylostoma*."

COUDERT, J. & COLY, M. Essai d'application de la réaction d'agglutination des particules de collodion à quelques parasitoses. [**Trials of the Collodion Agglutination Test in Some Parasitic Diseases**] *Ann. Parasit. Humaine et Comparée*. 1956, Oct.-Dec., v. 31, Nos. 5/6, 489-99, 1 diagram. [32 refs.]

The technique used was, with certain modifications, similar to that described by CAVELTI in 1944 [*J. Immunology*, 1944, v. 49, 365] and, later, employed by SASLAW and CAMPBELL (1949) for the diagnosis of histoplasmosis [this *Bulletin*, 1949, v. 46, 779 and 870].

The following is a rough translation of the authors' summary:—

The agglutination reaction with particles of collodion has the advantage of being a polyvalent reaction, for it can be sensitized by means of different antigens. The antigens likely to be used in each case must be chosen according to very exact conditions of preparation and preservation.

We have used lyophilized antigens, prepared from the following parasites: liver fluke, *Ascaris*, *Taenia*, trypanosomes, hydatid cyst, *Histoplasma capsulatum*. These antigens have given more interesting results than the liquid antigens of *Taenia*, hydatid cyst, *Histoplasma capsulatum* and *H. duboisii*, nematodes, toxoplasma.

The reaction can be used for the titration of antigens, in the presence of control serum from a patient or an animal. This titration has proved interesting when applied to the liquid of the hydatid cyst which has been preserved in ampoules, as well as for liquid histoplasmin.

The reaction has proved useful in diagnosing the following parasitic diseases: fluke infections, trypanosomiasis, cestode infections and others.

Some caution is still necessary, not as regards the specificity of the test, but as regards its sensitivity.

To obtain this agglutination reaction it is necessary to use fresh sera or sera kept under deep-freeze.

R. M. Gordon

DE CARNERI, I. Azione dei due antipodi ottici del cloramfenicolo e dei threo-1.P.nitrofenil-2.amino-1,3-propandioli enantiomorfi su alcuni protozoi parassiti. [**Effect of Two Optical Isomers of Chloramphenicol and their Undichloroacetylated Bases on Parasitic Protozoa**] Reprinted from *Farmaco*. 1956, Nov., v. 11, No. 11, 926-33. [31 refs.] English summary.

The author tested the *in vitro* effect of two optical isomers of threo-chloramphenicol and of their respective undichloroacetylated bases (enantiomorphic threo-1:p-nitrophenyl-2:amino-1:3-propandiols), used in various dilutions, upon cultures of *Entamoeba histolytica*, *Trichomonas*

hominis and *T. vaginalis*. The results are given in 7 tables, from which it is seen that the two optical isomers of chloramphenicol and their bases had a specific effect upon *E. histolytica*, which was independent of their bacteriostatic action upon the concomitant bacteria, while in the case of the trichomonads the effect of the chemicals increased progressively from chloramphenicol through the D-base to the L-base. C. A. Hoare

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

LOVE, G. J. & SMITH, W. W. **Preliminary Observations on the Relation of Light Trap Collections to Mechanical Sweep Net Collections in Sampling Mosquito Populations.** *Mosquito News*. 1957, Mar., v. 17, No. 1, 9-14, 3 figs.

This study was undertaken to compare collections of mosquitoes from light traps and from a non-attractive device. The construction and installation of the traps and nets are described and illustrated.

The results are examined of 60 weekly collections made throughout the mosquito breeding seasons of 2 years, though the distribution and density are not regarded as characteristic because of drought during the period.

Indices of attractiveness of the light traps for 27 species of mosquitoes were obtained by dividing the total number of specimens of each species caught in the light traps by the total number taken in the mechanical sweep nets. 10 of the species gave figures which might be regarded as statistically reliable. The first 5 species among these, in descending order, are *Uranotaenia sapphirina*, *Anopheles crucians*, *Aedes vexans*, *Culex* spp., *Anopheles quadrimaculatus*. The index of light trap attractiveness is statistically unreliable for 17 species owing to the small numbers collected by either or both methods but indications are that *Culiseta inornata* will exhibit a very high index as also will *Aedes mitchellae*, *Psorophora confinnis* and *Anopheles punctipennis*.

Mechanical sweep nets, being unattractive, catch only those mosquitoes which happen to fly into the path of the nets. Light traps may attract some mosquitoes from long distances and other mosquitoes may be collected in disproportionate numbers. Nevertheless, light traps are probably the best single method for sampling the mosquito population of an area. Other methods could be used at the same time and place and other indices obtained. Spatial distribution and activity patterns are to be reported elsewhere.

H. S. Leeson

COLLESS, D. H. **Notes on the Culicine Mosquitoes of Singapore. III.—Larval Breeding-Places.** *Ann. Trop. Med. & Parasit.* 1957, Mar., v. 51, No. 1, 102–16, 2 figs. [12 refs.]

A good deal of the abundance of the culicine population in Singapore is due to human activities in constructing “hyacinth-ponds” (about 5,000 on the island), drains and ditches which stagnate, and borrow-pits. Hoof-prints, wheel ruts, and various artificial or natural water containers, plant axils, pitcher plants, leaves and crabholes also provide breeding places for certain species. Marsh and freshwater swamps are not common, and saline habitats are infrequent or unproductive of mosquitoes because of control against *Anopheles sundaicus*; seepages are few as a result of control measures against *A. maculatus*.

The paper reports the species of culicine mosquito taken in the several categories of larval habitat available, with particular reference to the frequency with which species are found together or separately. From this is devised for 11 species found in hyacinth-ponds an “index of association”, which is found to correspond closely to subjective impressions so far obtained of the shift in species composition as such pools change from being heavily polluted with excrement and wastes to clean water when heavy rains fall. The index concerns mainly species of *Culex*. *Mansonia uniformis* and *M. indiana* are also abundant, particularly on water-hyacinth (*Eichornia*) roots. Details are given of culicines taken in the various other types of larval environment.

There is an interesting discussion which speculates on the interplay of adult habits and larval requirements in the adaptation of a mosquito species to its characteristic behaviour and environment.

D. S. Bertram

SENEVET, G., ANDARELLI, L. & LIEUTAUD, A. A propos de *Culex univittatus* Theob. [**Observations on *Culex univittatus***] *Arch. Inst. Pasteur d'Algérie.* 1957, Mar., v. 35, No. 1, 52–3, 1 fig.

MARKOS, B. G. & SHERMAN, E. J. **Additional Studies on the Distribution of Mosquito Larvae and Pupae within a Rice Field Check.** *Mosquito News.* 1957, Mar., v. 17, No. 1, 40–43, 2 figs.

See also this *Bulletin*, 1952, v. 49, 16.

McKIEL, J. A. **A Simplified Method for Large-Scale Laboratory Rearing of *Aedes aegypti* (L.).** *Mosquito News.* 1957, Mar., v. 17, No. 1, 25–9, 2 figs.

A full, illustrated description is given of a rearing unit for the mass production of adults of *Aedes aegypti*.

It consists of a water tank kept at a constant temperature, which

tapers at the top. In the tapered portion metal-screening is so fixed as to provide resting places for emerging adults. The top aperture can be closed by a slide and there is a sponge rubber seal between it and the cage which fits on top. The cage has an opening in its floor corresponding to the top opening in the tank; this is fitted with a swing cover and a metal-screen funnel. When a cage becomes filled with mosquitoes it can be replaced by an empty one. Provision is made for water aeration, heating, replenishment of larvae and water, drainage and inspection windows.

After some trials it was found that 40,000 larvae per unit could be reared at one time. About 2,500 adult mosquitoes were produced per unit per day and the time required to maintain this rate in 3 units was 2 hours per week per unit. A fourth unit was kept continuously stocked with never less than 5,000 larvae and for 8 months there was never any evidence that toxic products had accumulated. When necessary, surface film was removed with a bottle brush and water was drawn off and replaced with fresh.

It is thought that the method might be successful with other mosquitoes.

[Whether the eggs are obtained from the cages described or from other cages specially allotted for this purpose, is not mentioned.]

H. S. Leeson

MCDANIEL, I. N. & HORSFALL, W. R. **Induced Copulation of Aedine Mosquitoes.** *Science*. 1957, Apr. 19, v. 125, 745, 1 fig.

Male mosquitoes were decapitated (without anaesthetic). Each was lightly fixed by adhesive on the thorax to a piece of cardboard and the tip of the abdomen was then brought against the tip of the abdomen of a female which had been anaesthetized and was adhering by its thorax to a fine needle. The mosquitoes were ventral side upwards. Copulation in *Aedes stimulans* and in *A. vexans* took place readily with 90% successful insemination and production of viable eggs sufficient to maintain large colonies. Decapitation of the male head removes the suboesophageal ganglion and a nerve centre inhibiting copulation. This technique makes possible the breeding of laboratory strains of mosquito which do not mate readily in captivity.

[It is not quite clear from the note if failure to "inseminate *Culex pipiens* and *Anopheles quadrimaculatus*" by this method refers to intra-specific mating or attempted cross-mating of the species.]

D. S. Bertram

HADAWAY, A. B. **Residual Insecticides and Mosquito Control.** *Bull. World Health Organization*. Geneva. 1956, v. 14, No. 4, 813-16.

The formulation of an insecticide and the nature of the surface on which it is sprayed are important factors affecting the efficiency of the

insecticide in killing mosquitoes. Wettable powders are generally the most satisfactory, especially for porous materials, and 50% of the formulation should be insecticide.

The article goes on to recount the advantages and disadvantages of DDT, gamma BHC and dieldrin with special consideration of their adsorption into mud walls (particularly laterite muds). It is emphasized that, although laboratory experiments with mud blocks prepared from carefully sieved soils show that adsorption can greatly reduce the residual action of a non-volatile insecticide like DDT or dieldrin, the presence in practical construction of non-adsorptive particles such as gravel, straw and dung in mud-blocks restricts adsorption and promotes a better residual effect.

D. S. Bertram

BROWN, A. W. A. **Methods employed for determining Insecticide Resistance in Mosquito Larvae.** *Bull. World Health Organization*. Geneva. 1957, v. 16, No. 1, 201-4.

A review of official and semi-official methods in use, with suggestions for an internationally agreed compromise.

CORRÉA, R. R. & RAMALHO, G. R. Revisão de *Phoniomyia* Theobald, 1903 (Diptera, Culicidae, Sabethini). [**Revision of the Genus *Phoniomyia***] *Folia Clin. et Biol.* S. Paulo. 1956, Jan.-June, v. 25, Nos. 1/6, 1-176, 207 figs.

This systematic account of the mosquitoes of the South American genus *Phoniomyia* will interest the culicidologist. In 12 pages keys are given for the identification of the adults, the male genitalia, the pupae and the larvae of some 20 species. Descriptions and synonymy of these species, notes on geographical distribution and bionomics occupy 48 pages and the rest of the work consists of over 200 drawings of morphological details.

H. S. Leeson

KETTLE, D. S. **Preliminary Observations on Weather Conditions and the Activity of Biting Flies.** *Proc. Roy. Entom. Soc. of London*. Ser. A. 1957, Apr. 18, v. 32, Pts. 1/3, 13-20, 4 figs.

The flies were *Haematopota* and *Culicoides* in Britain.

LEWIS, D. J. **Observations on Chironomidae at Khartoum.** *Bull. Entom. Res.* 1957, Mar., v. 48, Pt. 1, 155-84, 9 text figs. & 4 figs. on pl. [Numerous refs.]

See also this *Bulletin*, 1956, v. 53, 1283.

PARROT, L. & ABONNENC, E. Notes sur les Phlébotomes. LXX.—Sur *Phlebotomus affinis* var. *vorax* Parr., 1948. [Notes on *Phlebotomus*. LXX. *P. affinis*] Arch. Inst. Pasteur d'Algérie. 1957, Mar., v. 35, No. 1, 43–4, 1 fig.

———. LXXI.—Sur *Phlebotomus katangensis* Beq. et Walr., 1930. [LXXI.—*P. katangensis*] Ibid., 45–51, 9 figs.

MER, G. G. & CWILICH, R. Observations on the Behaviour and Control of Houseflies in a Rural Area in Israel. III. On the Use of Diazinon Dust as Fly Larvicide. Riv. di Parassit. Rome. 1957, Jan., v. 18, No. 1, 35–42.

Three farming communities in Israel (between 500 and 900 people each and 70–170 cattle) had been incessantly plagued with house-flies. Anti-malarial DDT-spraying was ineffective because the flies were resistant; so the kitchens and dining halls were sprayed daily several times with a pyrethrin-BHC aerosol. The authors instituted larval control, using a dust composed of 1 part Diazinon 10% wettable powder to 15 parts dry sand. This was sprinkled over manure in the dairy barns daily before it was removed and in various places where the dung accumulated. A rate of 1 gm. pure Diazinon per cubic metre of manure was aimed at.

The treatments achieved a decided reduction of flies, judged both from larval and adult counts and inspections. The amount of work entailed was $\frac{1}{2}$ to 1 man-day per week per settlement and the cost of the materials was less than that of the pyrethrin aerosol. J. R. Busvine

LINDQUIST, A. W. Effectiveness of Organo-Phosphorus Insecticides against Houseflies and Mosquitos. Bull. World Health Organization. Geneva. 1957, v. 16, No. 1, 33–9.

Research by the Agricultural Research Service of the United States on organo-phosphorus insecticides indicates that these substances, although with shorter residual action than DDT, are usefully effective substitutes for DDT and other chlorinated hydrocarbons to which house-fly and some culicine mosquitoes have become resistant. It is thought, however, that their efficiency against anophelines, if they become more resistant than some now are, may be unsatisfactory.

The paper gives a good deal of condensed data on malathion, Diazinon, DDVP (with and without the addition of Arochlor 5460, a chlorinated terphenyl), Bayer L13/59, Bayer 21/199, and chlorthion. Synergists have not given consistently promising improvement in the action of organo-phosphorus compounds, although, for example, some good effects were obtained with piperonyl butoxide. Bearing in mind also their expense, synergists are not promising for large-scale control but may yet deserve consideration as adjuvants to organo-phosphorus compounds in

urgent problems of resistant insects. There is some evidence of resistance in house-flies to organo-phosphorus compounds (Bayer L13/59 and malathion) in the field but not to an alarming degree; laboratory experiments substantiate these observations.

D. S. Bertram

BUSVINE, J. R. **Inheritance of Insecticide Resistance in the Housefly.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 1, 205-6. [11 refs.]

A short review of experimental investigations of the subject.

BOCCACCI, M. & BETTINI, S. Potere insetticida per contatto dell'acido cloroacetico e di alcuni suoi esteri per le mosche "resistenti". [**Chloroacetic Acid and some of its Esters as Contact-Insecticides for "Resistant" Flies**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1956, v. 19, Pt. 12, 1237-46. [10 refs.] English summary.

"Iodo-, bromo- and chloroacetic acids and 20 esters of chloroacetic acid prepared by the authors, were tested against 'susceptible' and 'resistant' strains of houseflies on filter paper and on walls. Chloroacetic acid and some of its esters were shown to possess an insecticidal power of the same order as that of the well-known organic insecticides.

"No increase in the resistance of the two strains of flies against chloroacetic acid was obtained after a long selective process lasting 53 generations. The relatively low toxicity of the tested insecticides against vertebrates has been pointed out."

[This should not be taken to mean that these halogenated acetic acid derivatives are practical alternatives for DDT, dieldrin, etc. Most of the more active members are rather volatile and the maximum residual action observed was less than a week. Some compounds of this class are lachrymatory. The toxicity data for mammals refer only to the chloro-, bromo- and iodo-acetic acids.]

J. R. Busvine

TAUFFLIEB, R. & FINELLE, P. Étude écologique et biologique des Tabanides d'Afrique Equatoriale Française. [**Ecological and Biological Study of Tabanids in French Equatorial Africa**] *Bull. Inst. d'Études Centrafricaines.* (n.s.) 1956, No. 12, 209-51, 17 maps. [36 refs.]

This paper is divided into 3 parts.

The first part gives the distribution throughout French Equatorial Africa of 80 species belonging to the genera *Hippocentrum*, *Haematopota*, *Ancala*, *Euancala*, *Atylotus*, *Tabanus*, *Thaumastocera*, *Hinea*, *Thriambeutes*, *Subpangonia*, *Pangonia*, *Stenophara*, *Tabanocella* and

Chrysops. The distribution of the various species is illustrated by 17 maps. *Chrysops silacca* and *C. dimidiata* do not penetrate beyond 6°N., although both species are recorded from a number of localities south of this parallel.

The second part attempts to classify the species ecologically, dividing the fauna into groups of species characteristic of the different vegetational zones found in the area. There is a progressive reduction in number of species from south to north, associated with the lengthening of the dry season. In the south the rainy season extends over 7 months, whereas in the north the season lasts for only 2–3 months. Only two species (of *Tabanus*) have been found whose range extends from the southern forest to the most northern savannah, and Tabanids are absent from the desert.

The third part consists of a table of species with their recorded hosts. This useful summary has been compiled from the authors' own experience and also from the records of other authors listed in the bibliography.

B. R. Laurence

KRUMMEL, H. & BRAUNS, A. Myiasis des Auges. Medizinische und entomologische Grundlagen. [**Medical and Entomological Considerations on Ocular Myiasis**] *Ztschr. f. Angewandte Zool.* 1956, v. 43, No. 2, 129–90, 16 figs. [Numerous refs.]

JAMES [this *Bulletin*, 1948, v. 45, 1121] has adequately described systematically the dipterous larvae causing myiasis in man. Most of this paper consists of descriptions of dipterous larvae which have been, or might be, found in the human eye, and consequently contains little new information. The most common larvae causing conjunctivitis belong to the genera *Oestrus* and *Rhinoestrus*. Internal myiasis has been caused by larvae of *Hypoderma* and one case history, in which a larva was found in the anterior chamber of the eye of a 3½-year-old child, is reported here.

B. R. Laurence

ANGELILLO, B., DEIANA, S. & OLIA, P. Su un episodio di infestione cutanea da larve di trombiculidi nell'uomo. [**Cutaneous Infection from Trombicula Larvae in Man**] *Igiene Moderna.* 1956, Sept.–Oct., v. 49, Nos. 9/10, 654–70, 3 maps & 5 figs. (1 coloured on pl.). [12 refs.] English summary (7 lines).

Anti-mosquito personnel working at the Platamona swamp in north-west Sardinia near Sassari, were severely attacked by trombiculid larvae, possibly *Trombicula autumnalis*. Photographs illustrate the rank tall grasses in which the mites occurred, the lesions (in colour), and the mite; a line drawing of the scutum amplifies the text description of the

larva. There are several maps. It appears that protection against the attacks by applications of "Spray-tan" was effective for 48 hours.

D. S. Bertram

VANDE VOORDE, R. R. Un aspect chirurgical de la porocéphalose nymphale. [**Surgical Aspects of Infection with Pentastome Nymphs**] *Ann. Soc. Belge de Méd. Trop.* 1956, Dec. 31, v. 36, No. 6, 911-12.

Porocephalus (Armillifer) armillatus has been recorded at times in the Belgian Congo [this *Bulletin*, 1956, v. 53, 1186]. The present author records the case of an African of 23, who was operated upon for an acute abdominal crisis. At operation 4 nymphs of a pentostome were found in the mesentery, one was encysted in the serous coat of the ileum and one was perforating the ileum. These were removed, the perforation was closed and the patient made a good recovery. The diameter of the cyst varied between 4 and 9 mm. The parasite was identified as *Porocephalus*, but the species could not be determined owing to some degeneration of the specimen in transit to the laboratory.

H. J. O'D. Burke-Gaffney

MOOSER, H. & WEYER, F. Weitere Beobachtungen über die Wirkung von Butazolidin auf Insekten und Zecken. [**Further Observations on the Effect of Butazolidin on Insects and Ticks**] *Schweiz. med. Woch.* 1957, Apr. 6, v. 87, No. 14, Suppl., 424-5.

The following is a translation of the authors' summary:—

Butazolidin, the toxicity of which for *Pediculus humanus* was established in previous studies, proved to be ineffective against all larval stages of *Triatoma infestans*, against two kinds of flea, *Xenopsylla cheopis* and *Ceratophyllus fasciatus* and against two bloodsucking lice of animals, *Haematopinus suis* and *Pedicinus longiceps*.

H. J. O'D. Burke-Gaffney

BUSVINE, J. R. **Recent Progress in the Eradication of Bed Bugs.** *Sanitarian.* London. 1957, May, v. 65, No. 8, 365-9. [15 refs.]

DDT completely altered—and most favourably—the method and effectiveness of bed-bug control which in Britain, prior to about 1945, was dependent on the use of sulphur dioxide or hydrogen cyanide fumes, the former being rather ineffective and the latter temporarily effective but highly dangerous and expensive. Lethane 384 was useful during the war in keeping public air-raid shelters free of bed-bugs. Hydrogen cyanide has remained in use for fumigating furniture and personal effects in special fumigation vans while in transit from old to new houses. Methyl bromide may be adopted for this purpose and there is some evidence that this substance would also deal better with other household pests in furniture, etc. Field trials and experiments in Britain on DDT treatment

of bug-infested premises and the prevention of infestation are reviewed. Treatment of infestations as detected is preferable to preventive spraying which in normal or prefabricated houses may well be rendered ineffective by wallpapering or painting; nor would it ensure that introduced bugs did not establish a colony on furniture, especially in bed-frames. In Germany, virtual eradication by DDT was obtained in bug-ridden Berlin premises of many kinds; parathion was not sufficiently effective to warrant further use of such a toxic substance. Use of DDT since 1945, mainly as a spray but also in dust form, and sometimes other insecticides has greatly reduced the numbers of bug-infested houses in Denmark. From Italy, there comes from a refugee centre a report of bed-bugs resistant to DDT, partly to chlordane and dieldrin, but susceptible to and eliminated by gamma BHC, Diazinon and malathion. DDT-control is very effective in the U.S.A., and has been tested with satisfaction in the U.S.S.R.

It is noteworthy that there is evidence of DDT-resistant bed-bugs in Hawaii, Hong-Kong, Israel, and Singapore following widespread house spraying with this insecticide. Susceptibility to gamma BHC or dieldrin remains so far, however, high; [but see this *Bulletin*, 1957, v. 54, 889]. The possibility of bed-bug resistance to DDT becoming a more widespread problem cannot be overlooked.

D. S. Bertram

BROWN, W. B. **The Possible Use of Methyl Bromide in place of Hydrogen Cyanide for the Disinfestation of Furniture.** *Sanitarian*. London. 1957, May, v. 65, No. 8, 362-4.

Hydrogen cyanide has long been used in Britain for disinfecting furniture and bedding when transferring it from slums to new houses free of bed-bugs; steam disinfestation of bedding has also been used to reduce the risk of fatalities due to lack of airing before use. Methyl bromide is now being considered as preferable to hydrogen cyanide.

This article compares the two substances, both of which require expert handling by trained personnel in view of their toxicity to man, with the conclusion that further investigations on the use of methyl bromide are necessary to establish standards of effectiveness and safety besides clarifying the problem of persistent odours which sometimes follow treatment of woollens, horse-hair or foam rubber. Steps to this end have been taken by the Ministry of Housing and Local Government.

D. S. Bertram

DETHIER, V. G. **Insect Attractants and Repellents.** *Soap*. New York. 1957, Feb. & Mar., v. 33, Nos. 2 & 3, 83-7, 117; 97-101. [Numerous refs.]

These are short articles on the general principles of attractants and repellents of insects. For a fuller treatment of repellency, the reader

should consult the article by Dethier in the *American Annual Review of Entomology*, 1956, v. 1, 181.

The first of the present papers contains a useful tabular summary of experimental tests of repellents by various authors. J. R. Busvine

HOOGSTRAAL, H.; WASSIF, K.; KAISER, M. N.; SCHMIDT, K. P.; MARX, H.; TRAUB, R. **Results of the Namru-3 South-eastern Egypt Expedition, 1954. 1. Introduction, Itinerary, and Environmental Conditions** [HOOGSTRAAL, WASSIF & KAISER]. Reprinted from *Bull. Zool. Soc. Egypt*. 1955-1956, No. 13, 1-15, 3 figs. **2. Reptiles and Amphibians** [SCHMIDT & MARX]. *Ibid.*, 16-28, 4 figs. **3. *Argas brumpti* Neumann, 1907, and *Ornithodoros foleyi* Parrot, 1928 (Ixodoidea, Argasidae) in Egypt** [HOOGSTRAAL & KAISER]. *Ibid.*, 29-40, 7 figs. [Numerous refs.] **4. Fleas (Siphonaptera)** [TRAUB & HOOGSTRAAL]. *Ibid.*, 41-4. **5. Ticks (Ixodoidea)** [HOOGSTRAAL & KAISER]. *Ibid.*, 45-51. **6. Observations on Non-Domesticated Mammals and their Ectoparasites** [HOOGSTRAAL, WASSIF & KAISER]. *Ibid.*, 52-76, 1 map. [20 refs.]

South-eastern Egypt is zoogeographically a transitional zone between the Palaearctic and the Ethiopian region, the more mobile and larger mammals and a few of their ectoparasites being typical of the latter, while rodent and insectivore forms have their origins in the Near East and North Africa. This series of papers provides facts for this conclusion.

The first of the series provides maps of the area and contains matter describing it, its peoples, administration and the itinerary and diary of the expedition. Toads, geckos, and lizards number about 12 species including *Ophisops elbaensis*, a new species described and figured for the first time. There is a key to the 7 known species of this genus. 7 species of snake were taken. Notes are largely on the synonymy and locality records, with brief biological comments. The ticks *Argas brumpti* and *Ornithodoros foleyi* have both a scattered distribution in Africa. *O. foleyi* is now recorded from south-eastern Egypt besides in territories of North Africa west to Algeria. The present records extend the known distribution of *A. brumpti* from the Cameroons (north), Uganda, Kenya, Abyssinia and the Sudan up to near Luxor in Egypt.

The association of *A. brumpti* with dry arid conditions, buried in sand, rock holes, or in crevices of caves and wild animal lairs, is summarized from the literature and the present findings. Hosts appear to be various mammals and probably, commonly enough, lizards. *O. foleyi* has rather similar habits. Both species of tick were negative for spirochaetes. There is some evidence of painful bites to man by both species of tick. Illustrations in this paper are of each tick and a map of their known distributions.

The paper on ticks generally (*Ixodoidea*) reports briefly on *O. savignyi*, *O. foleyi*, *Argas reflexus*, and again *A. brumpti* and on 6 species of

Hyalomma, a collection of larvae and nymphs of this genus, and *Rhipicephalus sanguineus*. Only 4 of 30 forms of flea in Egypt were taken in the south-eastern region by the expedition. *Xenopsylla cheopis* infested jerboas of the coastal plain. *Synosternus*, which is abundant in cultivated Upper Egypt, was found in small numbers in wadis and on the coastal plain on rodent, hare, and fox. The last paper of the series records the wild mammals taken and their ectoparasites and briefly discusses their significance in relation to disease in man and his domestic stock. Relapsing fever seems not to be a problem in south-eastern Egypt; nor flea-borne diseases, since flea populations are very small. *Hyalomma dromedarii* on camels and gerbils, many immature forms of *Hyalomma* on various small mammals, and *R. sanguineus* on wild and domestic animals indicate need for further investigation of possible disease relationships to domestic stock.

There is an interesting pictorial map in the paper on mammals of the mountainous Gebel Elba area and adjacent plains showing the zonation of mammal distribution.

D. S. Bertram

HOOGSTRAAL, H. **African Ixodoidea. Vol. I. Ticks of the Sudan (with special reference to Equatoria Province and with Preliminary Reviews of the Genera *Boophilus*, *Margaropus*, and *Hyalomma*).**

This book was reviewed on p. 899.

SCHMIDT, K. P. & MARX, H. **The Herpetology of Sinai. *Fieldiana: Zool.* 1956, Dec. 13, v. 39, No. 4, 21-40, 4 figs. [13 refs.]**

A map of Sinai shows localities mentioned in the text, which is a systematic list of the 50 amphibia and reptiles of the area. Two snakes, *Lytorhynchus diadema* and *Telescopus hoogstraali*, are new and described (with photographs) for the first time. A key is provided for the differentiation of the genera of amphibia and reptiles of Sinai.

D. S. Bertram

MISCELLANEOUS PAPERS

RODENWALDT, E. Die geomedizinische Bedeutung menschlicher Einwirkungen auf die Oberflächengestalt der Erde. [**The Geomedical Importance of Human Activities on the Earth's Surface**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1957, v. 8, Nos. 1/2, 227-33.

This is an interesting essay in which the author discusses the significance of human activities on the earth's surface in relation to the

problem of establishing the complete causal chain in epidemiological problems. The discussion includes consideration of the effects of ancient and continued deforestation by fire and cultivation and of the associated changes in water conservancy, distribution and consequent soil development.

(An important paper for those interested in these subjects.)

B. G. Maegraith

REPORTS AND SURVEYS

MOÇAMBIQUE. Missão de combate às tripanossomíases. Relatório anual de 1954 [DE ANDRADE SILVA, M. A.]. [**Annual Report for 1954 of the Trypanosomiasis Commission**] 104 pp., 3 coloured folding maps & 13 figs. on 7 pls. 1956. Lourenço Marques: Imprensa Nacional de Moçambique.

The report deals with sleeping sickness in Mozambique up to and including 1954 in regard to the distribution, chemotherapy and control of the disease, its vectors and reservoir hosts.

The regional distribution of the 4 species of *Glossina* responsible for the transmission of trypanosomiasis is discussed in the text, but for most purposes is more satisfactorily shown in map form; these maps comprise one covering the whole country, together with two of selected smaller areas. The species concerned are *G. morsitans*, *G. austeni*, *G. pallidipes* and *G. brevipalpis*, of which only *G. morsitans* is widespread. Changes in distribution are compared.

No alteration in distribution of sleeping sickness was recorded. 267 new human cases of the disease were diagnosed during the year, an increase of 29 over 1953. An overall incidence, based upon the clinical examination of 637,503 persons, gave an index of 0.4 per 1,000 inhabitants. Chemotherapy was carried out by means of antrypol, tryparsamide, pentamidine and arsobal (Mel B); pentamidine was used prophylactically. Laboratory diagnoses are tabulated, and included the following:

- (1) blood tests—6,023 positive of 82,276; positives comprised 317 *Trypanosoma rhodesiense*, 1,075 *Dipetalonema perstans*, 14 *Spirochaeta duttoni*, 3,048 *Plasmodium falciparum*, 806 *P. vivax* and 763 *P. malariae*;
- (2) urine—355 of 765 positive for *Schistosoma haematobium*;
- (3) faeces—200 of 210 positive for *S. mansoni*, 1,253 of 1,836 positive for other helminths or their eggs.

Haematological investigation of domestic animals showed 534 of 11,479 positive for trypanosomal infections; these constituted 491 of 9,135 cattle, 1 of 41 donkeys, 23 of 249 pigs, 5 of 441 sheep and 14 of 999 goats. The trypanosomes responsible were *T. congolense* (138 cattle, 9 goats, 1 donkey, 11 pigs), *T. vivax* (330 cattle, 5 sheep), *T. congolense* plus *T. vivax* (23 cattle, 5 goats) and *T. simiae* (12 pigs). 56 of 4,217 game and other wild animals were infected with trypanosomes; those animals, with their respective indices, are listed by species. In all, 69,959 domestic animals were treated with trypanocidal drugs, principally by means of diamidine bromate and antrycide sulphate; babesine was used experimentally as a chemotherapeutic agent.

Control of tsetse was attempted by game slaughter, fly capture, disinfestation of traffic and brush clearing, in addition to drug prophylaxis. 3 entomological areas were considered. In the first of these 2,902 reservoir animals were killed and 2,685 flies recorded captured; 2,617 flies were identified as 2,004 *G. morsitans*, 531 *G. brevipalpis* and 82 *G. pallidipes*. Of 500 *G. brevipalpis* dissected for trypanosomal infection, 0.4% were proboscis positive, 5% gut-and-proboscis positive, and 1.4% gut positive. In the second area, 240 animals were killed and 314 *G. austeni* captured; of 216 *G. austeni* dissected, 38 were positive for trypanosomes (11 proboscis, 17 gut-and-proboscis, 10 gut only). The third area yielded 8,684 animals killed and 6,211 flies recorded captured; of 6,268 flies identified, all were *G. morsitans* except for 7 *G. austeni*. [The discrepancy between totals of flies captured and identified appears to be due to a failure to record all the flies taken.] In all areas, numerical data concerning reservoir animals and flies are compared with figures for previous years; in general, the numbers of flies show a progressive decrease.

[In addition to the data quoted, this report contains an assortment of related and unrelated information, for which the reader is referred to the original. On the whole, the presentation leaves much to be desired, but some epidemiological data are clearly presented. For the 1953 report, see this *Bulletin*, 1956, v. 53, 823.]

N. R. Phillips

BOOK REVIEWS

DE SOUZA-ARAUJO, Heraclides-Cesar. **História da lepra no Brasil. Vol. III. Período republicano (1890-1952).** [History of Leprosy in Brazil] pp. ix + 715. 1956. Rio de Janeiro: Imprensa Nacional.

This third volume of Dr. Araujo's monumental history covers the period following the establishment of the Republic in 1890, and traces the

progress of the campaign against leprosy up to 1930. The volume is divided into five chapters, the last of which, covering 56 pages, is devoted to a very complete bibliography of works on leprosy published in Brazil between 1931 and 1952.

The first chapter describes the situation regarding leprosy in Brazil in the last decade of the 19th century. The foundation and maintenance of the "Hospital dos Lazaros" in Rio de Janeiro are described in considerable detail. From its beginning up to 1897 some 2,090 patients were admitted.

In the second chapter the preliminary phase of modern prophylaxis is described. In 1904 Oswaldo Cruz, the Director of Public Health, instituted new regulations for prophylaxis of infectious diseases, including leprosy. Rules were made for domiciliary isolation of patients, some with greater and others with less rigour. In 1915 a Commission was appointed to consider the prophylaxis of leprosy. One of the questions discussed at great length by this Commission was the transmission of leprosy infection by blood-sucking insects, a view upheld particularly by Dr. Adolpho Lutz. The place of immigration in spreading leprosy, domiciliary transmission and the need for isolation were also considered by the Commission. An important event in the history of leprosy in Brazil was the congress held in São Paulo in 1916, in which the alarming spread of leprosy in that State was considered, and discussions took place as to the methods of transmission, and the best means of control. It was recognized that promiscuity was largely responsible for the spread of leprosy, along with a false form of charity which allowed the "*morpheticos*" ("*morphéa*" being the euphemistic word used for leprosy) to mix freely with the population. It was calculated at that time that there were about 2,000 patients with leprosy in the São Paulo State.

The third chapter is largely made up of the proceedings of a congress on leprosy held at Rio de Janeiro in 1918, when reports were received from many States of the frequency of the disease. The number calculated in the State of São Paulo had risen by 1929 to 12,000, compared with the 2,000 reported 11 years before, and a plan was made to admit 2,000 patients to the Santo Angelo Leprosarium instead of 800 as previously. In 1931 in the São Paulo State an inspector of leprosy was appointed for the Capital, and 6 regional sub-inspectors for the various regions; also, in addition to the Santo Angelo Leprosarium and the Santa Terezinha Asylum, 4 new leprosaria were planned. Also 2 societies were formed for the assistance of patients and the prevention of the spread of infection, one in Rio de Janeiro and the other in São Paulo.

Particulars are given of the measures for treatment and control of leprosy in the State of Paraná, where the author himself took a personal interest, and in all the other States as well as in the Federal District. In the Federal District in 1929 a survey showed no fewer than 2,045 as suffering from leprosy.

In the campaign against leprosy the Instituto Oswaldo Cruz, in which the author is the Professor of Leprology, took a leading part in investigations, training doctors, and proposing legislation for the control of the disease.

This volume contains many valuable documents not available to the public. As with the two former volumes [this *Bulletin*, 1948, v. 45, 1132], a thousand copies are printed to be distributed free to medical libraries.

Ernest Muir

SCHNITZER, Robert J. & GRUNBERG, Emanuel. **Drug Resistance of Microorganisms.** pp. xiv + 395, illustrated. 1957. New York 3: Academic Press Inc., 111 Fifth Avenue. London: Academic Books Ltd. [\$10.00.]

Acquired microbial resistance to chemotherapeutic agents, and particularly to antibiotics, has bulked more and more largely on the therapeutic horizon for some years past; indeed, its shadow threatens to nullify many of the benefits which recent discoveries have conferred. Many reviews of various aspects of the subject have appeared, but this is apparently the first attempt to deal with it in so comprehensive a way. The book is in 4 parts, the first 2 discussing drug resistance in protozoa and spirochaetes and in bacteria respectively, the third dealing with its mechanisms (including a short section on dependence), and the fourth, oddly entitled "Interference and Inferences", being concerned mainly with antagonism and synergy. Each section has a separate and extensive list of references, and there are full indexes to both subjects and authors. There are 96 tables; most of the 31 figures are line drawings but there are a few photographs of cultures and animal lesions.

In connexion with any example of acquired resistance it is desirable to know its rate of development and the degree attainable, the conditions under which it develops, the effect if any on the morphology, cultural characteristics, antigenic constitution and virulence of the organism, and whether or no the change is permanent. All these matters are very fully treated, as are the techniques employed in experimental study and what is known about the nature of the change. There is naturally a detailed discussion on the arguments for and against adaptation and mutation as its basis.

For the experimentalist in search of obscure information or of a broader concept of what has been achieved in laboratories the book will prove very useful, although this type of reader might have been grateful if the authors had attempted to draw more definite conclusions. For those interested in the clinical side of the subject it holds little. It would not be supposed from what is written about resistance to penicillin that *acquired* resistance to this antibiotic is not a clinical problem at all, it practically does not occur, and such organisms as the highly penicillin-

resistant meningococcus, the development of which is represented in Fig. 3, are merely laboratory curiosities. It is made clear that resistance to streptomycin can develop easily, but not that a substantial proportion of certain species throughout the world now possess such resistance and seem likely to retain it indefinitely. The clinical frequency of resistance to different antibiotics and the therapeutic problems which result are in fact scarcely discussed at all. Similarly the experimental findings in connexion with trypanosomes and malaria parasites are simply stated without translation into terms of therapeutic policy.

Although only one side of the subject is dealt with, it is admittedly the fundamental and more factual side on which all else depends, and the reader interested in this will be grateful for so industrious a compilation of work on so many aspects of it. Not many authors would venture to write in this connexion about both protozoa and bacteria, as well as spirochaetes and fungi.

L. P. Garrod